INSTRUCTION MANUAL

Model 600

Dip Meter

Serial No. 2460

BARKER & WILLIAMSON, Inc.

237 Fairfield Avenue • Upper Darby, Penna.

B&W

MODEL 600

Dip Meter

SPECIFICATIONS

Frequency Range	1.75 to 260 MC with 5 overlapping color coded plug-in coils
Dimensions	Approximately 3" x 3" x 7"
Weight	Approximately 2 lbs.
Power Supply	115 volts AC. 60 cycles
Tube	955 Acorn type
Meter	0-500 microamperes
Finish	Hammeroid gray

Coil Set No. 600-A

Coil No.	Frequency Range	Color Code
600–A–1	1.75 to 5.2 mc	Green
600–A–2	5 to 14 mc	White
600–A–3	14 to 36 mc	Yellow
600–A–4	36 to 95 mc	Blue
600–A–5	95 to 260 mc	Red

WARNING

***DEATH* OR SERIOUS INJURY MAY RESULT IF OPERATORS FAIL TO OBSERVE SAFETY PRECAUTIONS.**

EXTREME *CAUTION* IS TO BE EXERCISED DURING MEASUREMENTS AROUND LIVE POWER CIRCUITS CARRYING *LETHAL VOLTAGES.

KEEP A SAFE DISTANCE BETWEEN THE CIRCUIT UNDER TEST AND THE INSTRUMENT PROBING COIL.

AVOID *CLOSE* COUPLING TO HIGH R.F. POTENTIAL CIRCUITS.

FAILURE TO OBSERVE THESE PRECAUTIONS MAY NOT ONLY RESULT IN A DAMAGED INSTRUMENT, BUT MAY RESULT IN PERSONAL INJURY, IF NOT LOSS OF LIFE.

*Underwriters regulations consider any potential above 24 volts, lethal.

INTRODUCTION

The B & W Model 600 Dip Meter is a sensitive, accurate and versatile electronic instrument. Few devices will prove so handy in so many ways in the laboratory, ham shack, and radio-TV service shop.

The Model 600 consists of a compact, highly sensitive oscillator circuit utilizing a type 955 acorn tube powered from a 115 volt 60 cycle AC. line through the medium of a transformer and metallic rectifier.

A rust proof chassis and sturdy aluminum case contribute in making this unit rugged, light in weight and virtually impervious to the effects of normal climatic conditions.

Five sturdily constructed color coded plug-in coils are furnished with each instrument. Colored vinyl bands on the coils serve as a means of identifying each coil, and further match the colored ranges of the instrument dial.

The panel plate is of richly reverse etched aluminum, designed to withstand the wear of hard service.

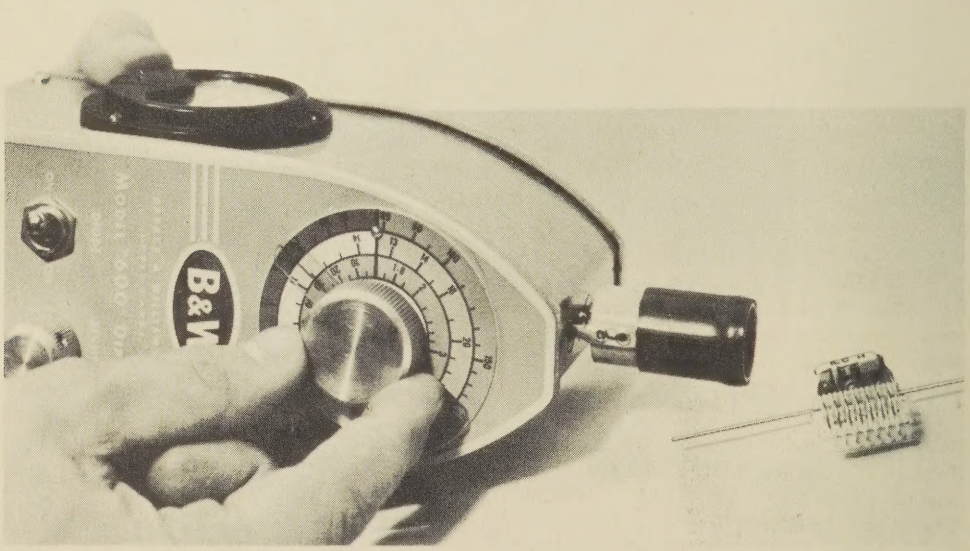
An adjustable sensitivity control permits adjustment of the meter to a suitable scale reading.

This simple, accurate and indispensable instrument is capable of saving the engineer, ham operator and service man much valuable time.

PUTTING THE INSTRUMENT INTO SERVICE

The instrument when shipped from the factory is complete with five color coded plug-in coils in a separate container box, a 955 acorn type tube which is already in place within the instrument, and an instruction book. The instrument when taken from its packing carton is ready for service.

To place the instrument in operation, insert the line cord plug into an AC. outlet delivering 115 volts 60 cycles single phase power, and turn the sensitivity control knob clockwise to turn power on. With the diode switch in the off position and a coil in place, a reading on the meter scale adjusted by the sensitivity control will indicate that the instrument is functioning and ready for service.



A MINIDUCTOR TRAP

The Model 600 is shown during the process of tuning a small trap circuit utilizing a B & W Miniductor coil and a compression type trimmer capacitor.

It may be similarily used for finding the resonant frequency of chokes and filters.

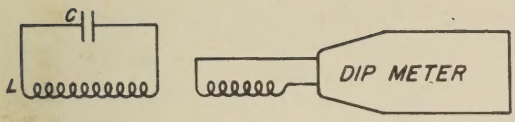


FIGURE 1

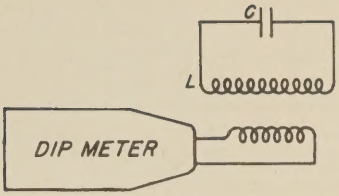


FIGURE 2

APPLICATIONS

DIP METER (Diode Switch "Off")

L C Circuits

The main function of the instrument, when used as a dip meter, is to indicate the resonant frequency of a tuned circuit. This is done by placing the coil of the instrument in close inductive relation to the coil of the circuit being measured, and rotating the tuning knob until a sharp dip is noted in the meter. See figures (1) and (2). The sensitivity control is used to keep the meter reading approximately in mid scale. When the position of the meter dip is ascertained, the coil distance is increased until the dip is barely discernible. The frequency of the circuit being measured is then read from the appropriate scale.

The above procedure is used in finding the resonant frequency of:

1. Traps and chokes
2. Tank circuits
3. I. F. circuits
4. R. F. circuits
5. Filters (high, low and band-pass) etc.

After the resonant frequency of a tuned circuit has been determined, the inductance or capacity may be found if one or the other is known. The nomograph (see Fig. 8) relating inductance, capacity and frequency has been prepared to facilitate this procedure. Known values of capacity can be purchased for use as standards, or established by the use of known values of inductance. An inexpensive source of inductance that can be easily trimmed and adjusted is the B&W Miniductor series. They are made in a number of inductance values as shown in the Miniductor inductance chart on Pages 8 and 9.

Note that the approximate "Q" or quality of resonant circuits may be compared by observing the sharpness of the meter dip as the condenser is rotated through resonance. A sharp dip indicates a circuit of higher "Q" than one with a broad dip.

When using the instrument at the extreme end of the highest frequency range, near 260 megacycles a spurious dip may be noticed that should not be confused with a resonance of the circuit under test.

Antennas and Transmission Lines

Antennas and transmission lines differ from ordinary lumped LC circuits in that the inductance and capacity is distributed. It is important to remember that more than one resonant frequency is present which must be taken into consideration. It is advantageous to determine in advance the approximate frequencies of interest and sketch the antenna and transmission line set-up in terms of current distribution.

Generally, the resonant frequency of an antenna is measured by coupling the coil of the instrument to the part of the antenna with a current maximum. Although points of voltage maximum may be used, they are best avoided due to the increased possibility of spurious dips. See figures (3),

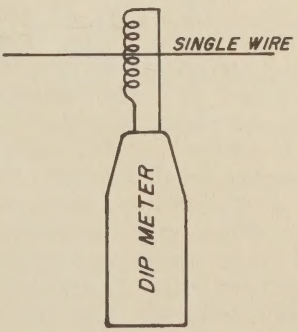


FIGURE 3

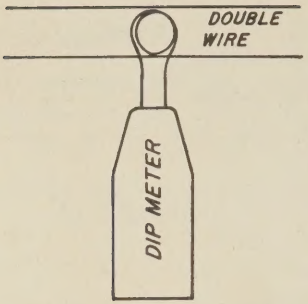


FIGURE 4

(4), (5) and (6). The adjustment of the instrument is then the same as for LC circuits. For example, the half wave antenna has a current maximum at the center. The driven element in a beam antenna is ordinarily a half wave. When its frequency is to be determined, it is necessary to disconnect all feeders and short out all breaks so introduced.

An antenna may also be operated on any multiple of its fundamental frequency. When this operation is desired, it is clarifying to sketch the current variation along the length of the antenna and make the frequency determination at one of the points of current maximum. For this frequency determination, it is also necessary to disconnect all transmission lines and short out any breaks.

The resonant frequency of a transmission line may be measured by considering it as similar to the folded section of an antenna. The instrument is coupled to a shorted end of the transmission line and measurement made as for an LC circuit. A sketch of the probable current distribution is helpful in determining the harmonic mode of operation. See figure (7). For instance, a one quarter wave transmission line with the far end open is similar to a half wave antenna and resonances will be found approximately at odd multiples of the fundamental frequency. When a transmission line is shorted at the far end, it may be considered as two quarter wave transmission lines placed back to back. The resonant frequency is then approximately twice that found with the far end open.

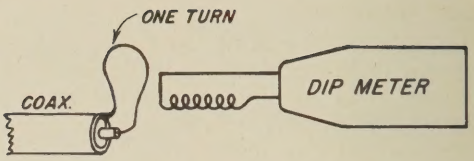
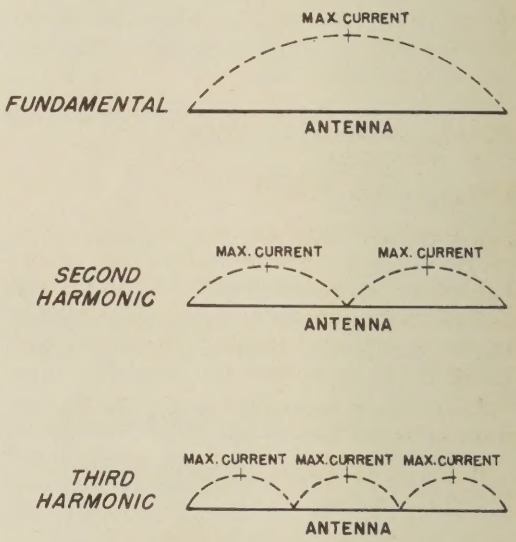


FIGURE 5

When the transmission line is terminated in a pure resistance equal to its characteristic impedance, it will be found that the resonances will disappear. Any other load will cause resonances to reappear except at those frequencies at which the load on the transmission line is equal to its characteristic impedance. These facts can be used to load a transmission line to a high degree of accuracy.



EXAMPLES OF RESONANT ANTENNA CURRENT DISTRIBUTIONS

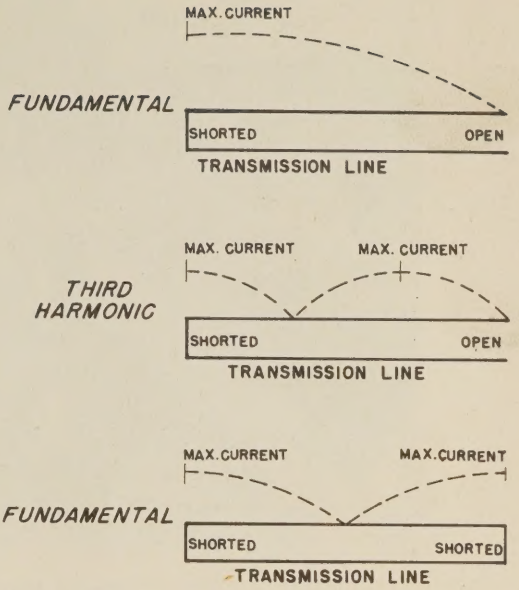
FIGURE 6

Signal Generator

The instrument can be used as a source of signal in the preliminary alignment of receivers. The amount of pickup by the receiver is varied by adjusting the position or distance of the instrument. The output signal is unmodulated, so that an R.F. type of signal tracer is necessary for indicating the proper alignment of the tuned circuits. The "S" meter, in some receivers, may be used as an indicating device for alignment.

The instrument is a convenient source of marker signals in the approximate adjustment of television circuits when using a sweep generator. In this case also, the intensity of the marker may be varied by adjusting the position or distance of the instrument from the circuit under test.

For isolation, markers and test signals may be fed to various circuits by means of a transmission line. The input end of the transmission line should be shorted with a loop that is lightly coupled to the coil of the instrument. The output of the transmission line is then fed into the equipment under investigation by any convenient means.



EXAMPLES OF RESONANT TRANSMISSION LINE CURRENT DISTRIBUTIONS

FIGURE 7

SIGNAL INTENSITY METER AND MONITOR
(Diode Switch "On")

In this case, the instrument functions as an R.F. pickup device where the meter deflection is proportional to the signal picked up by the coil. The sensitivity may be increased by coupling the coil of the dip meter to an antenna.

As a signal intensity meter, the instrument is useful in:

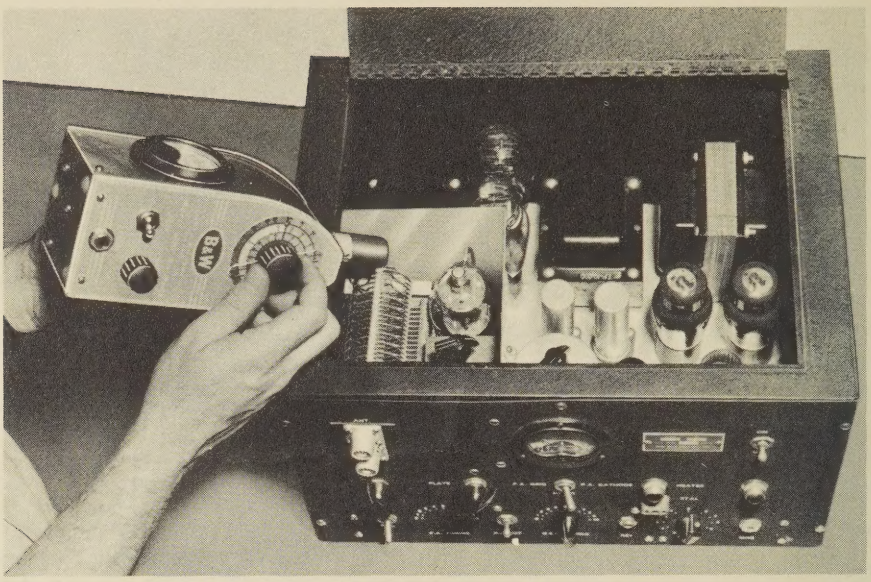
1. Relative field strength measurements
2. Neutralization
3. Harmonic and parasitic analysis
4. Investigation of standing waves on open transmission lines.

Inserting a phone plug into the "phone" jack disconnects the meter and enables the modulation on the signal to be monitored. The instrument may then be used for the determination of:

1. Hum and noise
2. Distortion
3. Quality

When using crystal head phones, place a 10,000 ohm resistor in parallel with them so that a DC path is provided to ground.

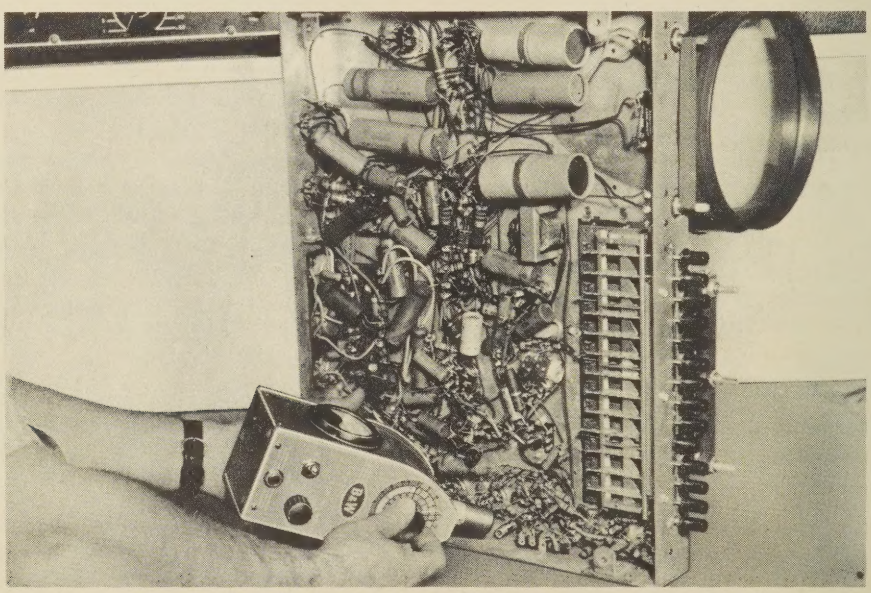
★ ★ ★



HAM TRANSMITTER

Here the Model 600 is shown performing one of its many and useful services in the ham shack. It may be further used to neutralize the transmitter, locate spurious oscillations and their frequencies, pretune all stages and as a field strength meter.

As a monitor it is indispensable for audible observation of hum level, noise, quality and general characteristics of the signal.

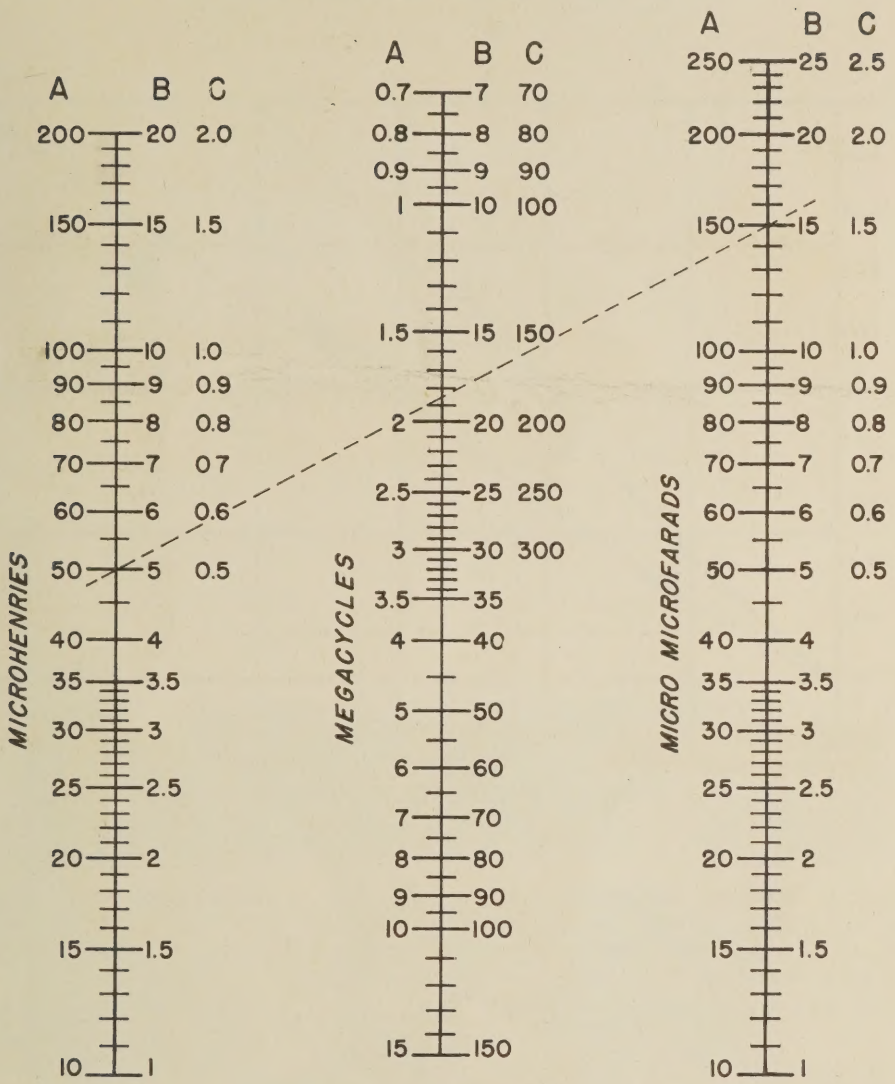


SERVICE SHOP

The preliminary alignment of the I.F. circuits in a TV receiver is shown in this photograph.

The Model 600 is also a valuable aid in the high frequency alignment of radio receivers of the all-band type. In service work it is useful in the alignment of R.F. and I.F. circuits, and as an auxiliary signal generator.

NOMOGRAPH
FOR
INDUCTANCE – FREQUENCY – CAPACITY



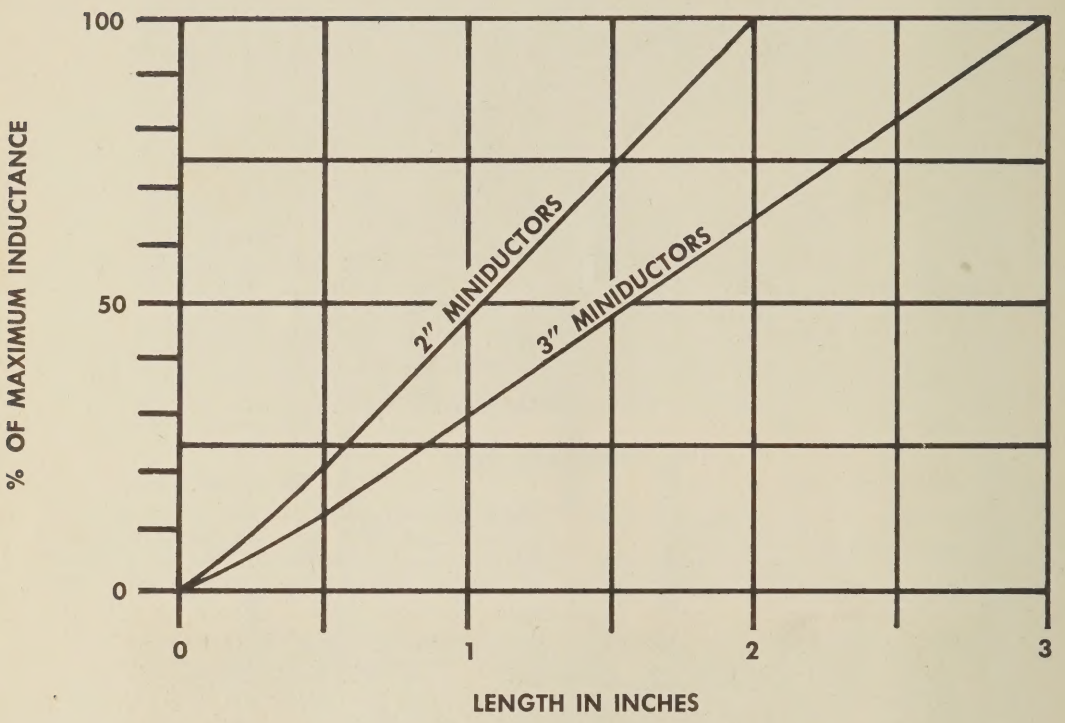
NOTE: *SCALES LETTERED "A" ARE USED TOGETHER, AS ARE SCALES "B" AND "C". IN USE, PLACE A STRAIGHT LINE BETWEEN ANY TWO KNOWN VALUES TO FIND THE THIRD.*

EXAMPLE: (NOTE DOTTED LINE) *USING SCALE "A"*

INDUCTANCE = 50 MICROHENRIES
FREQUENCY = 1.85 MEGACYCLES
CAPACITY = 150 MICRO MICROFARADS

FIGURE 8

PROPORTIONAL INDUCTANCE OF MINIDUCTORS VS. LENGTH



This reprint of a graph indicating proportion of inductance versus length of Miniductors will be useful for determining the approximate value of inductance remaining after a standard length has been cut.

Here is an example on how to use the graph for determining inductance versus length. These formulae apply to all Miniductors.

EXAMPLE:—Let us determine the approximate inductance value of a 1" section of Miniductor #3012 whose length is three inches and total inductance value is 24.0 Microhenries. By referring to the graph, we find that a one inch length of Miniductor coincides with the 3 inch curve at a point representing 27% of the total length. 27% of 24μh = 6.48μh.

Should the inductance value required for a given application be known, the reverse of the above procedure would apply.

EXAMPLE:—A small coil having an inductance value of 6.48μh is required. Assuming that a #3012 Miniductor is at hand, whose total inductance value we know is approximately 24μh, we arrive at the length by first learning the percentage of 6.48μh to 24μh or 6.48 ÷ 24 = 27%.

Due to possible inaccuracy in cutting, plus other variable factors beyond control, the resultant *value of inductance* remaining after a standard length of Miniductor has been trimmed, may be considered as approximate only.

CAUTION:—In trimming or cutting Miniductors, be sure to allow at least one extra turn on each end for lead lengths.

MINIDUCTOR SPECIFICATIONS

Catalog Number	Dia.	Turns Per Inch	Length	Approx. Inductance μh
3001	½″	4	2″	0.19
3002	½″	8	2″	0.75
3003	½″	16	2″	3.0
3004	½″	32	2″	12.0
3005	⅝″	4	2″	.28
3006	⅝″	8	2″	1.1
3007	⅝″	16	2″	4.5
3008	⅝″	32	2″	18.0
3009	¾″	4	3″	.37
3010	¾″	8	3″	1.5
3011	¾″	16	3″	6.0
3012	¾″	32	3″	24.0
3013	1″	4	3″	1.0
3014	1″	8	3″	4.0
3015	1″	16	3″	16.0
3016	1″	32	3″	64.0

LABORATORY EXPERIMENTS

In the laboratory, the Model 600 is a versatile and indispensable piece of test equipment. It can save the engineer many valuable hours during the course of experiments and general electronic work.

Here it is shown being used in an investigation of the self resonant frequency of solenoid coils.

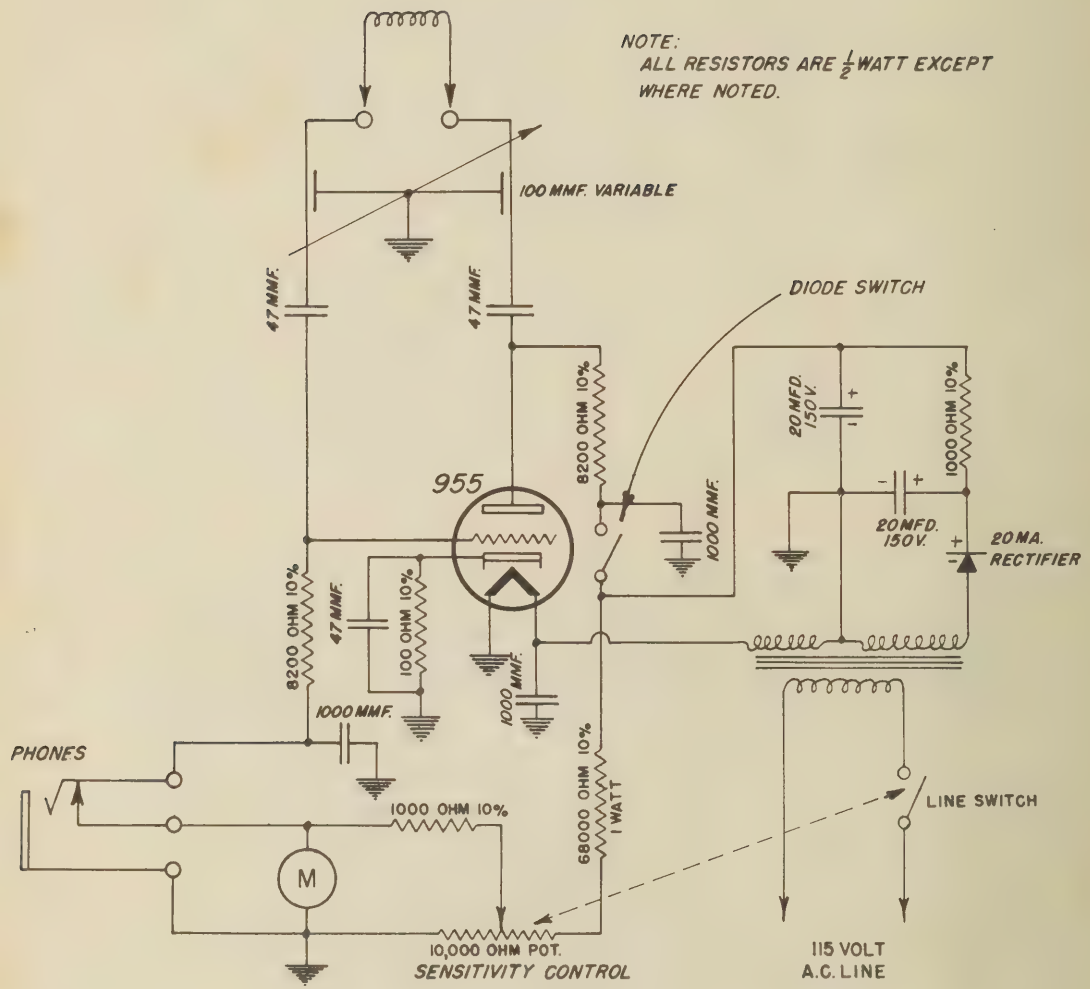

NOTE:
ALL RESISTORS ARE ½ WATT EXCEPT
WHERE NOTED.
100 MMF. VARIABLE
47 MMF.
47 MMF.
DIODE SWITCH
8200 OHM 10%
955
1000 MMF.
20 MFD. 150 V.
1000 OHM 10%
20 MFD. 150 V.
20 MA. RECTIFIER
8200 OHM 10%
47 MMF.
100 OHM 10%
1000 MMF.
1000 MMF.
PHONES
1000 OHM 10%
68000 OHM 10% 1 WATT
LINE SWITCH
M
10,000 OHM POT.
SENSITIVITY CONTROL
115 VOLT
A.C. LINE

FIGURE 10

MAINTENANCE

When judiciously used and rough handling avoided, the instrument should give long and satisfactory service with a minimum of maintenance.

In time the instrument may show signs of reduced sensitivity and output, particularly on the higher frequencies. This is occasioned by tube aging and a new 955 oscillator tube should be employed.

To replace the tube, remove the two 6/32" round head screws on the back of the instrument near the bottom. The back will then lift off and the tube can be replaced.

Parts and values will be found in the schematic diagram, figure 10.

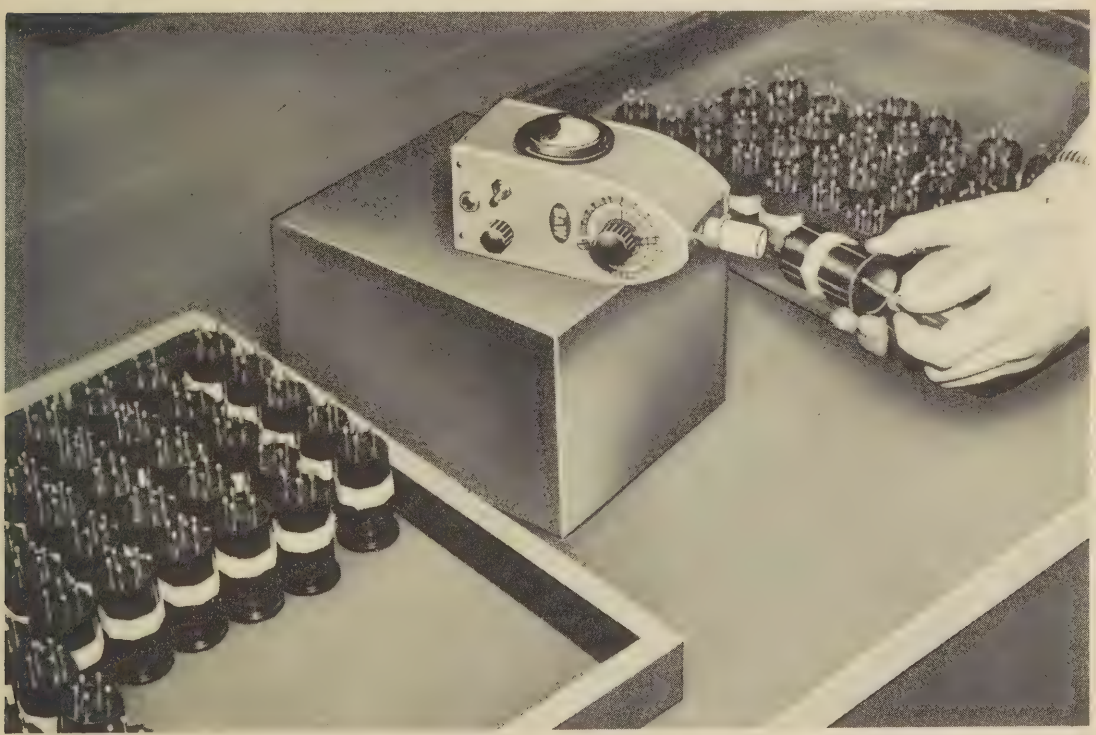
In case of severe damage to vital parts of the instrument it should be returned to the factory for repairs.

A serial number is stamped on the bottom of each instrument and a registration card attached to this instruction book.

Each registration card has provisions for the insertion of the name and address of the customer, the date of purchase, and the distributor from whom it was purchased.

These registration cards must be properly filled out and immediately returned to the factory. Failure to return your registration card automatically voids our guarantee given on the back cover of the instruction book.

Additional copies of the Instruction Manual are available for 25 cents each.



PRODUCTION LINE

Production line testing can be speeded up by using the B & W Model 600 Dip Meter.

The above photograph is a typical example in which the instrument is left in a fixed position. This is only one of the many ways in which the instrument can be useful in electronic component production.

SPECIAL USES

Many special uses for the B&W Model 600 Dip Meter will suggest themselves as familiarity with the instrument is gained. A few of these special applications are described below.

Mutual Inductance Between Two Coils

Connect the two coils in series and the combination across a standard capacitor. Measure the resonant frequency and determine the combined inductance as outlined in an earlier paragraph under "Applications—*L C Circuits.*" The connections to one of the coils is then reversed and the inductance of the combination again determined. The effective mutual inductance between the two coils is equal to one-fourth the difference between the two resultant measurements.

Coefficient of Coupling Between Two Coils

Measure the inductance of each coil leaving the other coil open. The coefficient of coupling is given by the following formula:

$$K = \frac{M}{\sqrt{L_1 \times L_2}}$$

where M is the mutual inductance and L_1, L_2 are the self inductances of the two coils respectively.

Measurement of Length of Cable

Open one end of the cable and short the other end with a small loop. Couple the instrument to the shorted end, and starting with the lowest frequency, note the frequencies of successive dips. The fundamental resonant frequency (based on a quarter wave) is approximately equal to one half the difference between two successive dips.

The physical length of the cable may now be calculated by the following formula:

$$L = \frac{246 \times k}{f\ (mc)} \text{ feet}$$

where L = length of cable (feet)
f = resonant frequency (megacycles)
k = relative propagation constant as given by cable manufacturer.

This scheme for finding cable length is of great utility when the cable is wound on a drum and it is not feasible to unwind it. Sometimes false dips are evident, due to proximity and sheath resonances, so that several determinations should be made until the results seem reasonable.

Use of Arbitrary Scale

One arbitrary scale (0-100) has been provided on the instrument for the purpose of calibrating coils that have been made by the user for covering special frequency ranges. Blank coil forms may be purchased for this purpose from B&W.

For a particular purpose the overlaps of the frequency ranges provided may be insufficient. A special coil can then be wound for bringing a particular frequency into the center of the range.

The frequency spread of the instrument may be greater than needed. It is possible, by means of special coil and condenser combinations, to bandspread a particular section of the range. This is done by the judicious variation of coil turns and shunting capacity until a desired result is attained.

STANDARD WARRANTY

Adopted and Recommended by the Radio-Television Manufacturers Association

Barker and Williamson, Inc. warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to us or to our authorized radio dealer or wholesaler from whom purchased, intact, for our examination, with all transportation charges prepaid to our factory, within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products.

BARKER & WILLIAMSON, INC.

237 FAIRFIELD AVENUE

UPPER DARBY,

PENNSYLVANIA

5M 7/52

Printed in U.S.A.

Barker & Williamson

HF Linear Amplifier PT-2500A Instruction Manual

Index

1.0 Specifications

1.1 RF Specifications

Frequency Range

160 meters	1.8 to 2.0 MHz
80 meters	3.5 to 4.0 MHz
40 meters	7.0 to 7.3 MHz
30 meters	10.1 to 10.15 MHz
20 meters	14.0 to 14.35 MHz
17 meters	18.068 to 18.168 MHz
15 meters	21.0 to 21.45 MHz

Drive Power
100 W nominal to 125 W maximum for full output

RF Output Power
SSB 1.5 KW PEP continuous
CW 1.5 KW Average continuous

Plate Voltage (Operate position)
RTTY/AM/ATV SSB/CW 3.0 KV VDC

Efficiency
60% minimum on all bands.

Input Impedance
50 ohms. Tuned impedance matching circuit, SWR <1.5:1 (16 db return loss)

Output Impedance
50 ohms SWR <2:1

Harmonic Suppression
50 db minimum

Intermodulation Distortion Products
33 dB down minimum

1.2 General Information

Power Tubes
Two Eimac 3-500Z zero bias triodes

Circuit Type
Class AB_2 grounded grid

Tube Cooling
Pressurized plenum and chimney cooling system. 60 cubic ft. per minute. Low noise squirrel cage blower. External muffin fan for extended continuous service.

*FCC rules permit any properly licensed amateur to modify his own amplifier for 10 meter use. Consult the factory for details. If this modification is done with reasonable skill and care, the warranty will not be void.

Type of Emission
SSB, CW, RTTY, AM, ATV

Duty Cycle
Continuous duty in all modes

ALC Circuit
Negative, adjustable to -30 VDC

Antenna Relay
DC relay for hum-free operation

Metering
1 Meter measures plate current
2nd Meter measures plate voltage, grid voltage, output power, reflected power

Output Circuit
Pi-L network (silver plated air coil) and 6KV tuning capacitor.

Input Circuit
Pi network input for each band for maximum drive and linearity.

Protective Devices
AC line fuses, cathode zener fuse, SCR crowbar grid protect circuit

Safety Feature
Interlock for AC line input.

Power Requirements
115/230 VAC, 30/15 amps (230 VAC factory wired and recommended)

Power Transformer
Special power transformer designed for continuous service. Rated at 1300 VA 60 Hz. Weight 40 lb (18.2 kg) Separate filament transformer.

Dimensions
17" W x 8-1/2" H x 19" D (including dials)
(43.2 x 21.6 x 49.3 cm)

Weight
80 lb (36.3 kg). Shipped in three cartons.

1.3 Tube Specifications

Filament

Voltage	5.0V
Current	14.2A

Direct Interelectrode Capacitances (grounded grid)

Input	8.3pF
Output	4.7pF
Feedback	0.07pF

Frequency of Maximum Rating

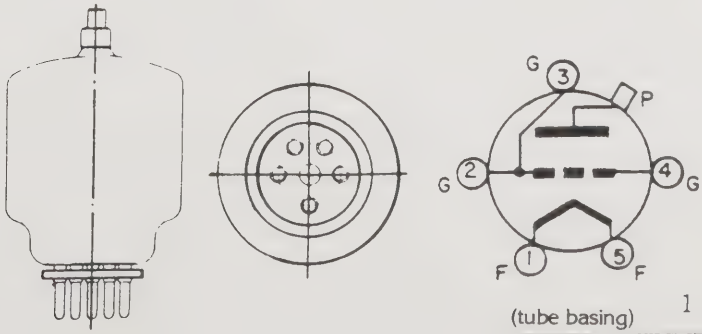
CW	110 MHz
Operating Position	Vertical, base down or up

Maximum Operating Temperature

Plate Seal	225° C
Base Seals	200° C
Cooling	Radiation and forced air
Base	5 Pin Special

Maximum Ratings

DC Plate Voltage	4000 Volts
DC Plate Current	0.40 Ampere
Plate Dissipation	500 Watts
Grid Dissipation	20 Watts



(tube basing)

2.0 Introduction

The PT-2500A Linear Amplifier is a one stage, class AB_2 Linear Amplifier using two glass envelope, high performance Eimac 3-500Z power tubes. It is a completely self-contained table-top unit capable of 1500 watts PEP or CW output, designed to provide reliable, stable, high RF output power. It is equipped with a pressurized plenum cooling system to ensure optimum operation for extended periods of continuous use. The circuit and components are conservatively designed and selected for effortless operation under all conditions.

2.1 Features

2.1.1 Designed for SSB, CW, RTTY, AM or ATV operation on the amateur bands between 1.8 MHz and 21 MHz. (Including WARC bands and MARS operation.) May be customer modified to cover the 28 MHz band. Please consult the factory.

2.1.2 Can be modified for frequencies outside the amateur bands for commercial or military use. Please consult the factory.

2.1.3 Fast heating high performance 3-500Z triodes ensure rapid turn-on time.

2.1.4 Continuous duty squirrel cage blower plus external muffin fan for extreme extended use.

2.1.5 The Pi-L circuit features;
a) Heavy duty, 7KV rotary switch with silver plated contacts.
b) A high quality, dual section 6KV plate tuning capacitor which maintains constant Q.

2.1.6 Pi network input for each band.

2.1.7 The power supply features a special heavy duty (40 lb.) "continuous" rated 1300 VA power transformer, a separate filament transformer and computer grade filter capacitors for maximum reliability.

2.1.8 Power transformer transient protected.

2.1.9 By-Pass standby switch on front panel.

2.1.10 Adjustable ALC Control (up to —30V).

2.1.11 Dual backlit meter system to monitor all critical voltages and currents.

2.1.12 Mode switch for optimum efficiency in all modes of operation.

2.1.13 Vernier tuning for smooth and accurate settings on all bands.

2.1.14 Safety interlock disconnects AC line voltage when the top cover is removed.

2.1.15 SCR actuated grid protect circuit.

3.0 Installation

PLEASE READ THE INSTRUCTIONS carefully and fully before attempting to operate the amplifier.

CAUTION: There are very dangerous voltages present inside the amplifier when the power is on. Two interlock switches will automatically disconnect the AC line voltage when the top cover is removed. Use the utmost caution and care if AC power must be on while the top cover is removed.

3.1 Unpacking

Remove the amplifier from the shipping carton and examine for damage, (notify the transport company immediately if any damage is present.)

Save the carton for future shipment to another location or storage.

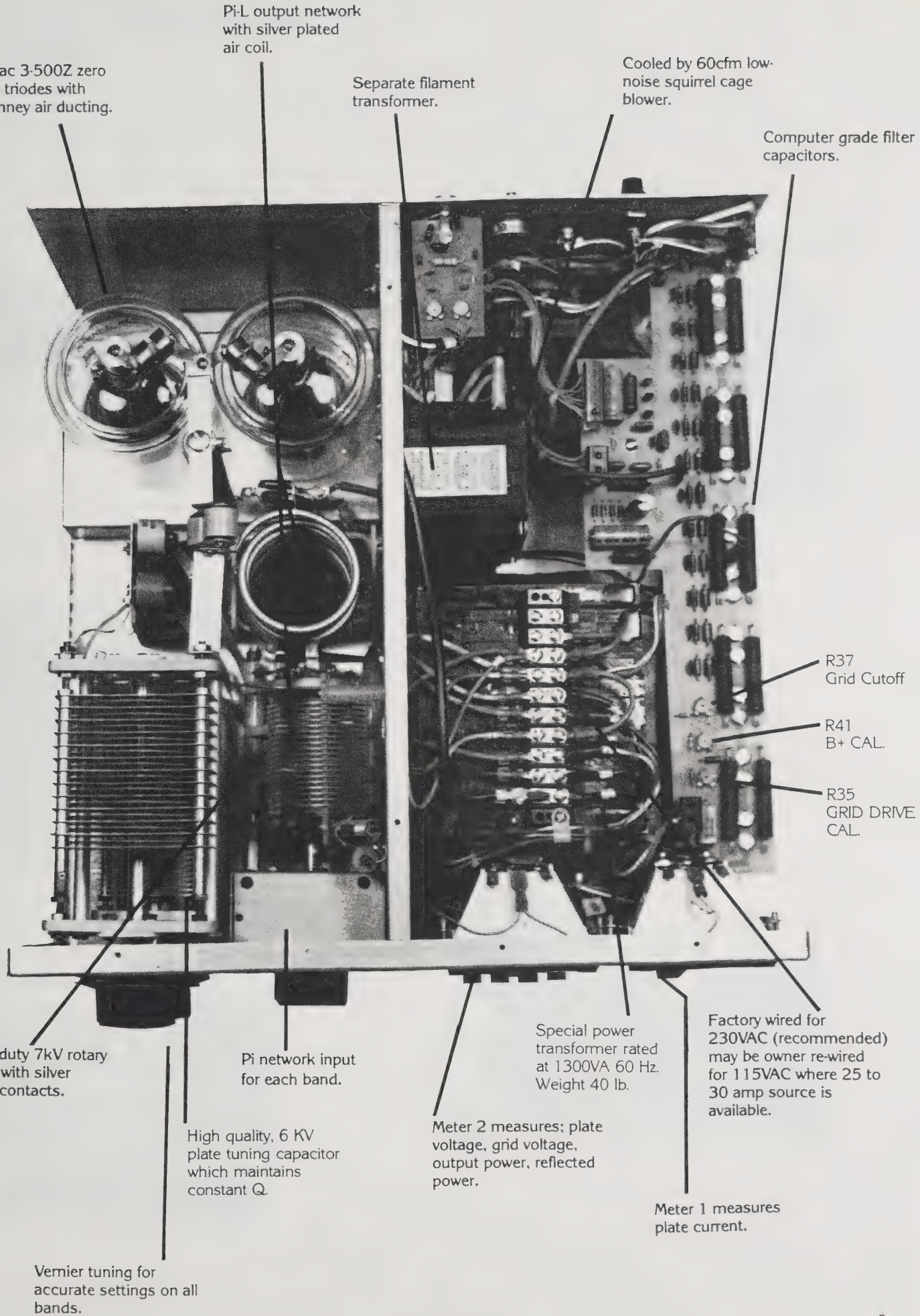
The 3-500Z triode tubes and the power transformer are shipped separately and must be installed before operating the amplifier in any way.

The following items and accessories are included with your PT-2500A amplifier:

1. Instruction Manual
2. Warranty Card
3. Two 3-500Z Tubes
4. Two Glass Chimneys (packed in amplifier)
5. Power Transformer
6. Control Cable (2)
7. AC Power Cord
8. Jumper Wire
9. Two Plate Cap Heat Sinks
10. Extra Fuses (One Zener - AGC 1 and two ABC15)
11. 7/16" T Wrench
12. Three 1/4-20 Hex Nuts

3.2 Operating Location

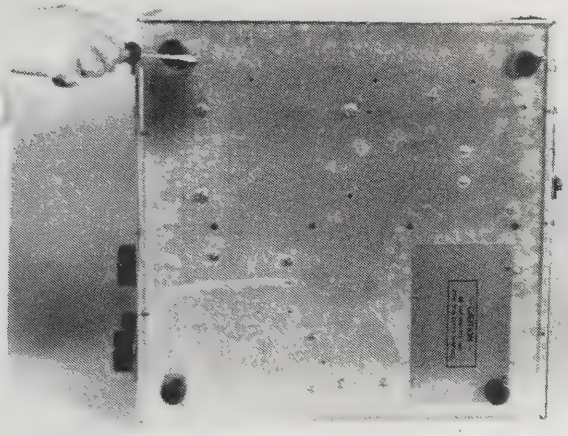
The amplifier must be located in an open area such that the flow of air from the top (and back for the muffin fan) is unrestricted. Location should be as close as possible to a reliable 115/230 VAC source to minimize any AC voltage drop.


Pi-L output network with silver plated air coil.
Eimac 3-500Z zero bias triodes with chimney air ducting.
Separate filament transformer.
Cooled by 60cfm low-noise squirrel cage blower.
Computer grade filter capacitors.
R37 Grid Cutoff
R41 B+ CAL.
R35 GRID DRIVE CAL.
Heavy duty 7kV rotary switch with silver plated contacts.
Pi network input for each band.
Special power transformer rated at 1300VA 60 Hz. Weight 40 lb.
Factory wired for 230VAC (recommended) may be owner re-wired for 115VAC where 25 to 30 amp source is available.
High quality, 6 KV plate tuning capacitor which maintains constant Q.
Meter 2 measures: plate voltage, grid voltage, output power, reflected power.
Meter 1 measures plate current.
Vernier tuning for accurate settings on all bands.

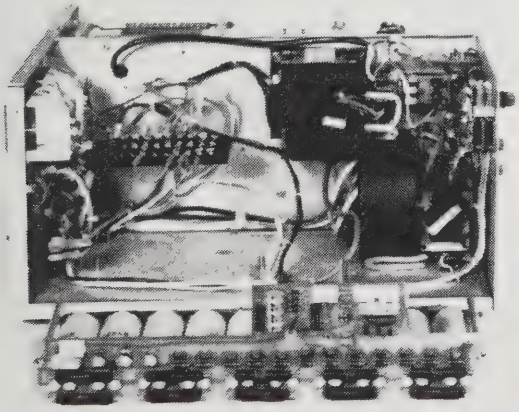
3.3 Power Transformer Installation

1. Remove the cover. Remove all cover screws. Note that all screws along base are machine screws while all others are self-tapping screws.
2. Remove the packing material found in the RF and power supply sections and remove the packed chimneys.

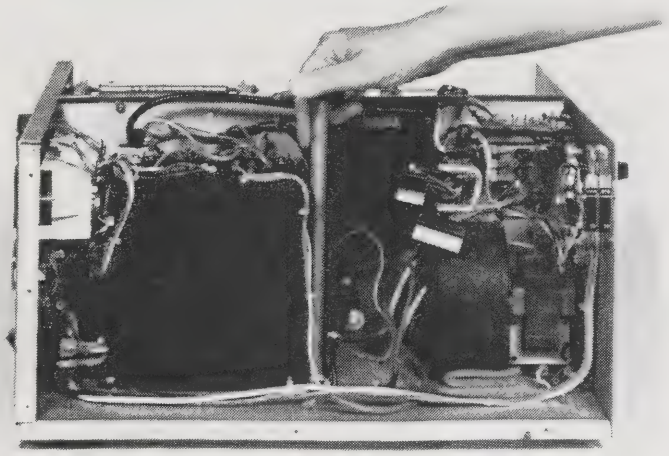
3. Disengage the filter capacitor assembly by removing 3 - #8-32 machine screws found on the filter printed circuit board. Place the filter assembly on the work surface along side the amplifier.



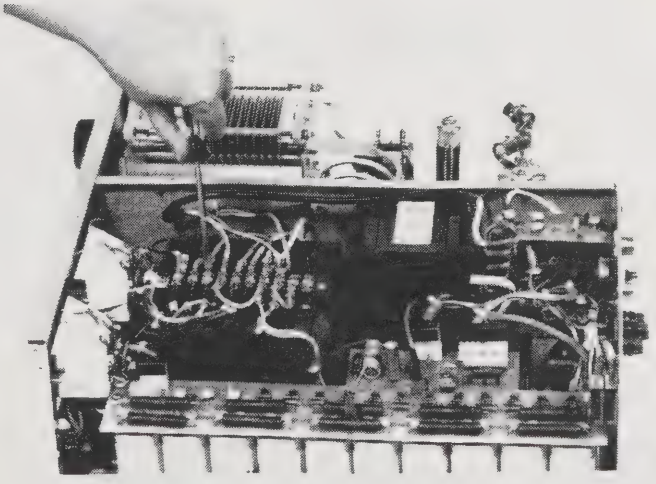
4. Position the terminal block with attached harness to allow clear access to the transformer area.



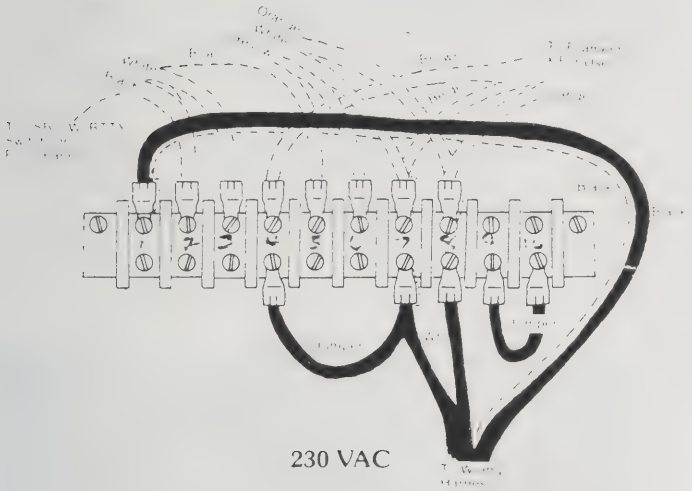
5. Carefully place the transformer over the 3 1, 4-20 transformer mounting studs. To install 1/4-20 hex. nuts, press a nut into the driver end of "T" wrench supplied with the amplifier. The nut will remain in the wrench until nut stud threads are started.



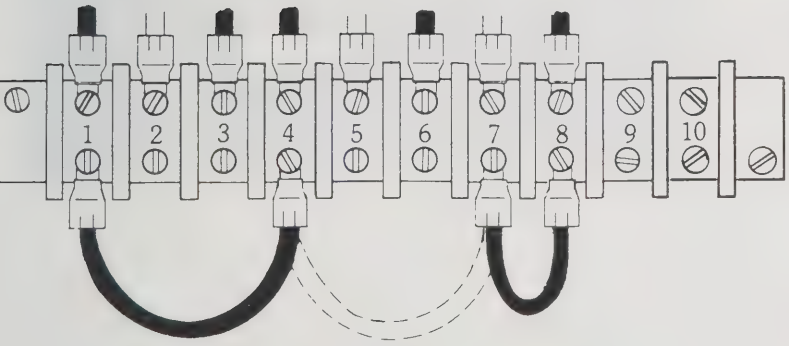
6. Remove 2 - #6-32 machine screws holding the terminal I.D. board on the top of the transformer.
   (a) Place the terminal block over the I.D. board and secure both to the transformer with the 2 #6-32 screws.



(b) Attach the 6 transformer primary leads and plate harness leads to the terminal block contacts. The transformer leads are numbered to correspond with terminal block numbering. Do not over-tighten terminal block screws.



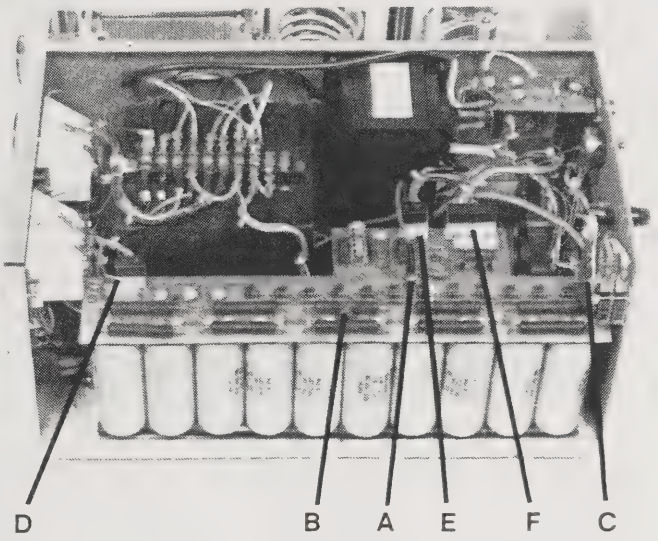
7. The terminal block is wired for 230 VAC operation. For 115 VAC operation (not recommended unless 25 - 30 amp source is available), remove the jumper connected between terminals 4 and 7 on the terminal block and connect it between terminals 1 and 4. Take a short jumper from the accessory kit and connect it between terminals 7 and 8.



8. Re-attach the filter assembly to the vertical rods using 3 #8-32 machine screws.

9. Connect the black lead from the power resistor mounted on the plate transformer to the terminal indicated on the filter capacitor board. (Lead A in photo below.)

10. The last step is the connection of the plate transformer secondary start lead (red) and high voltage lead (red). This is done with the use of male-female slip-on lugs.



11. Connect the black lead A, red lead B, and red high voltage lead C as indicated in the photograph. Reconnect the three multipin connectors D, E and F as shown. Be sure to establish positive contact for all connections. This completes the transformer installation. Double check all connections to avoid possible damage.

3.4 Power Tubes Installation

For the power tube installation you will need:
Two 3-500Z tubes (packed separately)
Two glass chimneys (packed inside the amplifier)
Two plate cap heat sinks (provided in accessory kit)

1. Unpack all items and inspect for damage. Any damage should be reported to the carrier.
2. If cover not yet removed, see Steps 1. and 2. in Section 3.3 for instructions on cover removal.
3. Carefully install the two power tubes in their sockets. **Be very careful not to exert lateral or twisting pressure on the glass portion of the tubes. They are very easily damaged. Excessive pressure can cause a hairline fracture in the tube's glass envelope, destroying the tube. The pins are also particularly delicate and can easily break if the tube is not inserted and removed very carefully.**

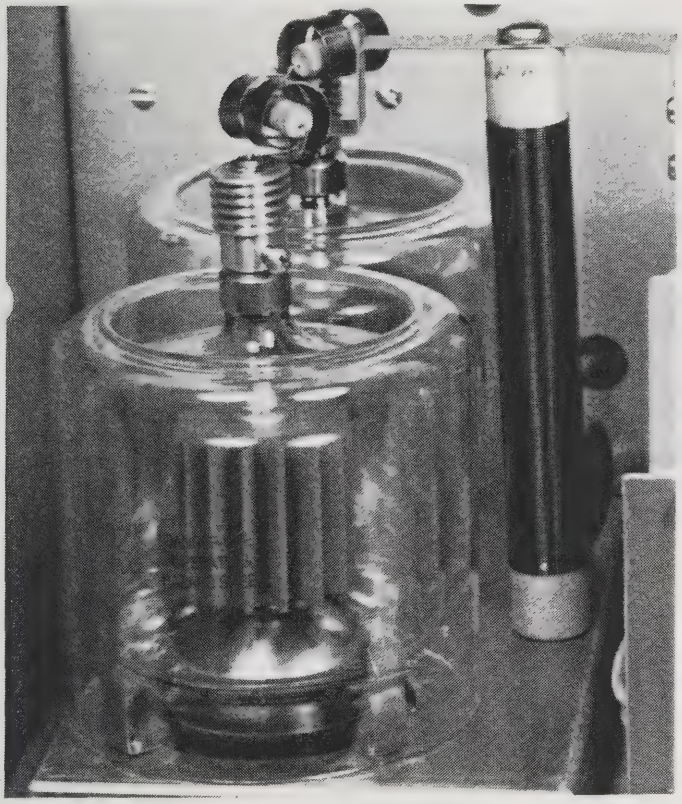
4. Carefully set the glass chimneys in place over the power tubes making sure all holding clips are **inside** the chimneys.

5. Set the plate cap heat sinks in place on the anode connectors of the power tubes. Gently tighten the set screws.

6. Remove the screws and lock washers from the tops of the heat sinks and attach the parasitic chokes. **Caution:** Hold the heat sinks firmly when attaching these leads to avoid transferring any twisting pressure to the power tubes.

7. This completes the power tubes installation.

8. You are now ready to re-assemble the cabinet.



9. **Re-assemble the cover**
   Before re-assembly, note the red safety lock micro-switches mounted on the rear panel. The switch buttons must be engaged by the underside of the cabinet. When positioning the cabinet over the amplifier, listen for the click of the microswitches to ensure they are engaged.
10. Attach the cover screws near the microswitches first, then install the remainder of the screws ensuring that the machine screws go in the tapped holes at the chassis base.

3.5 Cabling

All the following cables must be connected before the amplifier is operated.

3.5.1 AC Power Cable:

Your PT - 2500A amplifier comes from the factory wired for operation from a 230 VAC single phase, 60 Hz power source. For 115 VAC operation, several jumper connections on the power transformer terminal strip have to be changed. See page 5.

The green wire in the power cord is the ground wire and **MUST BE CONNECTED TO THE GROUND PIN (GREEN SCREW) OF THE PLUG THAT YOU SELECT FOR CONNECTION INTO THE POWER LINE.** The socket of the AC cord plugs directly into the back panel AC input plug.

> **CAUTION:** The amplifier will be damaged if the green wire is connected incorrectly. Be sure to disconnect the AC plug from the amplifier before changing jumpers on the terminal strip.

3.5.2 Antenna Coax: Use only RG 8/U coax (or its equivalent) to connect the PT-2500A to the antenna. The antenna connector mates with the connector marked RF OUT, on the rear panel of the amplifier.

> **CAUTION:** Do not operate the amplifier without a load or into a load with SWR greater than 2:1. Measure the antenna's SWR with an SWR meter or in-line Watt-meter and determine that the SWR is in fact less than 2:1.

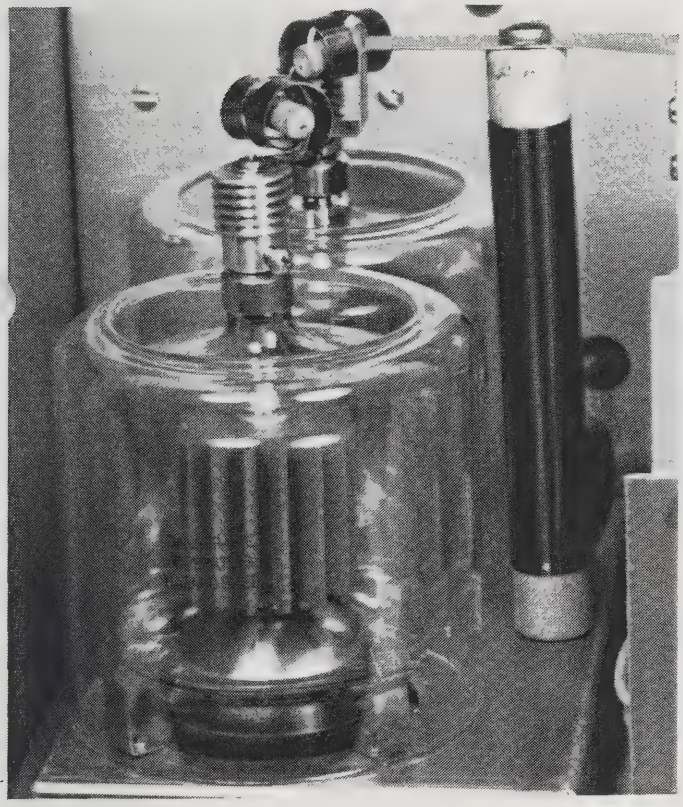
4. Carefully set the glass chimneys in place over the power tubes making sure all holding clips are **inside** the chimneys.

5. Set the plate cap heat sinks in place on the anode connectors of the power tubes. Gently tighten the set screws.

6. Remove the screws and lock washers from the tops of the heat sinks and attach the parasitic chokes. **Caution:** Hold the heat sinks firmly when attaching these leads to avoid transferring any twisting pressure to the power tubes.

7. This completes the power tubes installation.

8. You are now ready to re-assemble the cabinet.



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All the following cables must be connected before the amplifier is operated.

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3.5.2 Antenna Coax: Use only RG 8/U coax (or its equivalent) to connect the PT-2500A to the antenna. The antenna connector mates with the connector marked RF OUT, on the rear panel of the amplifier.

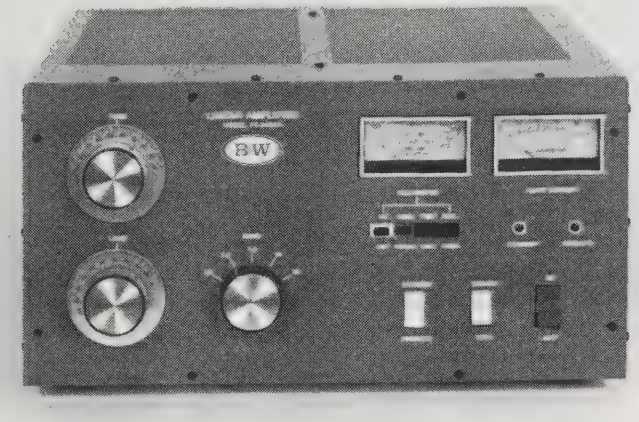
> **CAUTION:** Do not operate the amplifier without a load or into a load with SWR greater than 2:1. Measure the antenna's SWR with an SWR meter or in-line Watt-meter and determine that the SWR is in fact less than 2:1.

3.5.3 Input Cable: A cable must be connected from the output of your exciter to the RF IN connector on the back panel of the amplifier.

3.5.4 ALC (automatic level control) Cable: Plug the ALC cable into the phono jack located on the back panel (marked ALC) and into the ALC feedback connection (or equivalent) on the exciter. If the exciter does not have provision for feedback of ALC voltage from the amplifier, then simply omit the use of the cable.

3.5.5 Antenna Relay: A control cable should be plugged into the phono socket marked ANT RELAY on the back panel of the amplifier. This cable connects the keying signal from the exciter to switch the amplifier to the transmit condition and must be plugged into the socket or connector marked Antenna Relay (or equiv.) on the exciter. The exciter need only supply a shorting relay contact (during transmit) to key the amplifier.

CAUTION: Do not apply any voltage to the antenna relay phono jack. The internal relay is activated by a self-contained power supply.



4.0 Operating Controls

4.1 Front Panel Controls:

4.1.1 Off/On Power Switch: Used to turn the amplifier on and off.

4.1.2 Multimeter Switch: Four section pushbutton switch selects the multimeter functions as described below.

HV: With this pushbutton depressed, the meter monitors the amplifier's plate voltage. The full scale reading in this mode is 4000 VDC. Normal plate voltage with the amplifier in the standby position (unkeyed) is about 3500 VDC for SSB/CW operation and 2400 VDC for RTTY operation. Line voltage variations will cause corresponding variations in the plate voltage. **(Note: Reading for plate volts is X10.)**

GRID: With this pushbutton depressed, the meter monitors the amplifier's grid current. The full scale meter reading in this mode is 400 ma DC. The nominal grid current during SSB on peaks is approximately 100 ma.

Maximum tune-up grid current in SSB or CW single tone is 240 ma marked on the dial as a red bar.

FWD: In this mode, the meter monitors the output power of the amplifier - maximum reading is 2000 watts.

REFL: In this mode, the meter monitors the reflected power. The full scale reading of the reflected power scale is 200 watts.

4.1.3 SSB/CW/RTTY Switch: This 2 position switch selects the two plate voltages to ensure correct loading and output for each type of emission.

4.1.4 Standby/Operate Switch: This switch allows the exciter bypass feature i.e. in the STANDBY position, the power of the exciter bypasses the linear amplifier and appears unchanged at the output connector. In the OPERATE mode the linear amplifier is ready for transmitting.

4.1.5 Standby/Operate Lights: These pilot lights marked "Standby" and "Operate" indicate the status of the STANDBY/OPERATE switch. In the STANDBY mode, the red light is on and in the OPERATE mode, the green light is on.

Tune and Load Settings

These are approximate settings for a 52 ohm load, mid band, CW mode, with 100 watts drive.

FREQ. (MHz)	Tune	Load
1.85	95	75
3.85	40	40
7.25	35	60
10.00	42	58
14.25	15	85
18.00	20	80
21.25	11	90

4.1.6 Load Control: This control matches the amplifier's output network to the load. Refer to table above for the approximate initial settings for the frequency range desired. A load setting of 0 corresponds to maximum capacitor mesh and 100 represents minimum capacitor setting.

4.1.7 Tune Control: The TUNE control is a vernier dial connected to an air variable capacitor in the RF section. The disc dial is screened 100 to 0 indicating that maximum capacitance is at 100 and minimum at zero. Approximate settings for the tune control for the amateur bands are given in the table above for your convenience.

4.1.8 Band Switch: The band switch selects the applicable input and output circuits for the PT-2500A to operate in any one of the following bands:

(a) 160 meters 1.8 to 2.0 MHz
(b) 80 meters 3.5 to 4.0 MHz
(c) 40 meters 7.0 to 7.3 MHz
(d) 30 meters 10.1 to 10.15 MHz
(e) 20 meters 14.0 to 14.35 MHz
(f) 17 meters 18.068 to 18.168 MHz
(g) 15 meters 21.0 to 21.45 MHz

NOTE: The amplifier has the capability to transmit on many frequencies outside the above bands by switching the amplifier to the band closest in frequency to the desired operating frequency. For services other than amateur use, this may be applicable.

CAUTION: Never move the band switch while the linear amplifier is keyed or operating.

4.2 Back Panel (See also Section 3.5, Cabling Pg. 7)

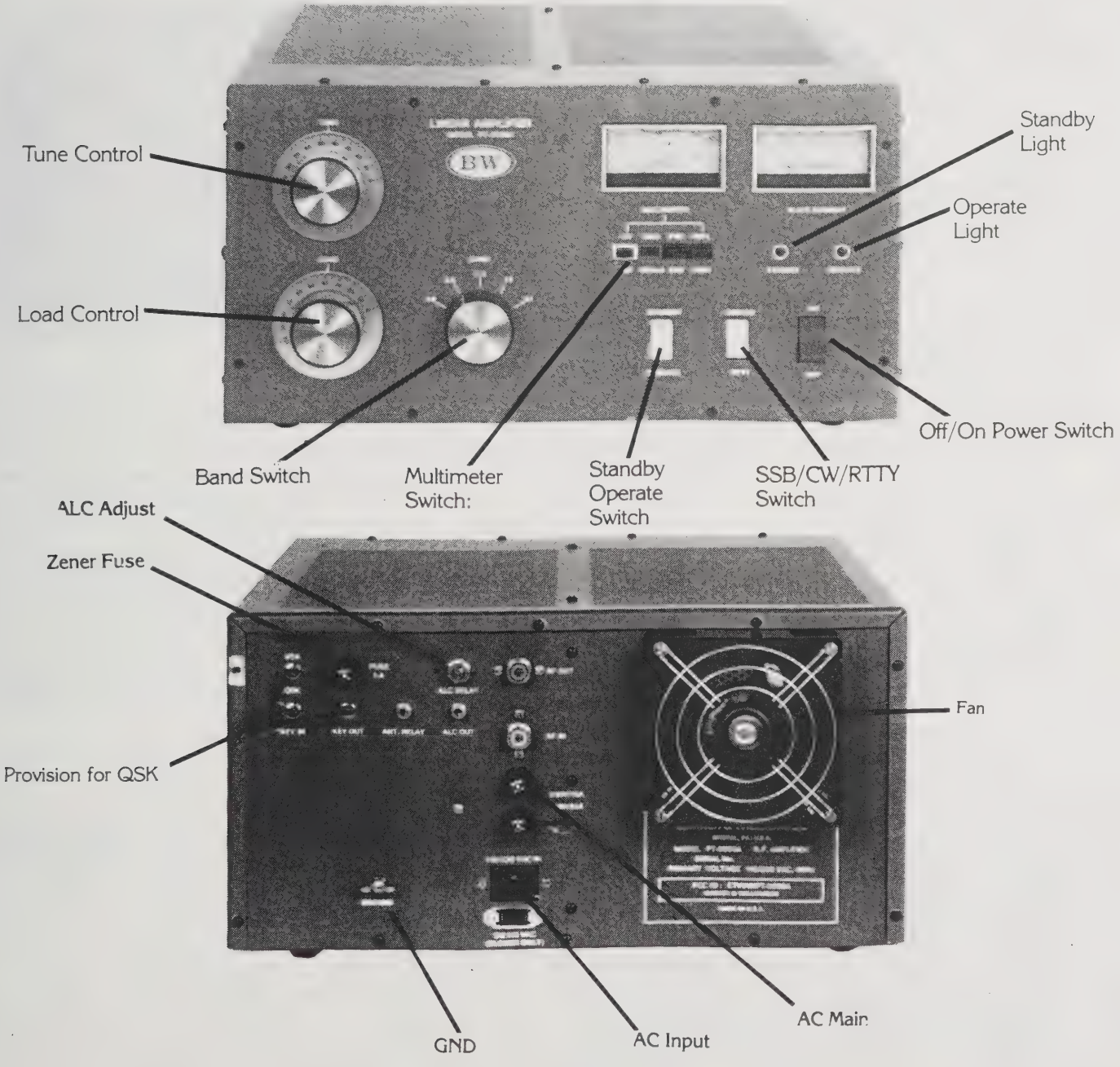
4.2.1 Zener Fuse: Protects the cathode circuit from overcurrent. It is a 1 amp fast-blo type.

4.2.2 ALC Adjust: Controls the delay of the PT-2500A's ALC circuit.

4.2.3 AC Main: Two fuses for the 115/230 VAC line input. They are ABC ceramics and must not be substituted by any other types.

GND: This lug is provided to ground the amplifier. It should be connected to a good earth ground to minimize radiated interference or the danger of electrical shock.

4.2.4 AC Input: This is the AC line input plug that accepts a heavy duty power cord. Note the 3 pin arrangement on the plug and the fact that the center pin is ground. Push the socket of the power cord when ready for use so that it is fully seated in the plug. The use of a substitute cord is not recommended.



5.0 Operation:

NOTE: Use a 50 ohm dummy load only for all the following adjustments. Adjustments into an antenna can result in illegal output power levels and/or interference on the amateur bands.

5.1 Preliminary Settings	Setting
1. STANDBY/OPERATE switch	STANDBY
2. SSB/CW/RTTY switch	RTTY
3. Multimeter switch	GRID
4. ON/OFF switch	OFF

Activate the ON switch and the red STANDBY pilot lamp and the meters should light. Look into the interior of the amplifier to make sure that the tube filaments are lit and that there is a flow of air from the top of the cabinet. This can be done by putting your hand over each tube from the top to feel the flow of air.

5.2 Operation

The 3-500Z requires no warm-up time.

1. Push the HV pushbutton on the MULTIMETER switch bank. The meter should read approximately 2.80 indicating a plate voltage of 2800 in the RTTY mode.
2. Set the SSB/CW/RTTY switch to SSB/CW. This should give a corresponding reading of 3800 VDC.
3. Set the SSB/CW/RTTY switch back to RTTY position.
4. Push GRID on the MULTIMETER switch bank.
5. Set the BAND switch to the desired band.
6. Pre-set the TUNE and LOAD vernier dials to those settings referred to in calibration chart below.

FREQ. (MHz)	Tune	Load
1.85	95	75
3.85	40	40
7.25	35	60
10.00	42	58
14.25	15	85
18.00	20	80
21.25	11	90

5.2.1 SSB Operation:

1. Set the STANDBY/OPERATE switch to OPERATE. The green OPERATE lamp should light.
2. With the exciter adjusted for zero output, press the PTT switch of the exciter causing the PT2500/A and the exciter to go into the transmit mode.
3. The amplifier's plate current meter should register approximately 40 ma. (Note SSB/CW/RTTY switch in RTTY). Set the SSB/CW/RTTY switch to SSB/CW. This shoudl register a plate current reading of approximately 100 ma. Set the SSB/CW/RTTY switch back to CW.
4. Increase the RF output of the exciter until the amplifier's grid current is about **90 ma**. Adjust the TUNE control for a minimum plate current reading indicating resonance. If the LOAD control is set properly, the plat current will be approximately **400 ma**. If the plate current is less than 400 ma increase the load slightly by moving the LOAD control to a higher number on the dial. If the plate current is more than 420 ma, decrease the load slightly by moving the LOAD control to a lower number.

   Do not forget to re-dip the **TUNE control** each time the LOAD control is changed.

   Check that the grid current reading is approximately 80-90 ma. If not, re-adjust the exciter output to give the required 80 ma ± 10% grid current reading. Under normal conditions, there will be some interaction between the TUNE control, LOAD and the grid current.

NOTE: The tuning, loading and exciter control adjustments may have to be repeated several times until the ratio of 80 ma grid to 400 ma plate current is obtained. Note that at higher frequencies, the adjustments are sharper while at lower frequencies they are broad.

5. To verify the peak power condition increase the RF output of the exciter for a plate current reading of 800 ma. With the full drive, the grid current should be 240 ma (red mark on dial). Single tone adjustments while tuning should be made such that the grid current **never** exceeds 240 ma. Exceeding these limits very quickly reduces the life of the tubes. (Use dummy load only for these measurements.)

NOTE: It is normal for the 3-500Z tubes to show colour, glowing a pale red with 400 ma of plate current and possibly a brighter cherry red at 800 ma. When operated in this manner, the tubes are within their ratings and can be operated in this way only if the plate circuit is at resonance (plate current dipped to a minimum with tune control). The amplifier should never be operated for any length of time in an off resonance condition.

CAUTION: Under no circumstances should the plate current exceed 800 ma nor the grid current exceed 240 ma.

6. Release the PTT switch of the exciter to allow the amplifier and exciter to go into the unkeyed status. Place the exciter into the SSB/CW mode and while speaking into a microphone, adjust the audio gain control for voice peak plate current readings of around 350 ma. Since the meter is average reading and cannot follow the peaks (which are about 800 ma), the meter will indicate the highest average plate current. The grid current peaks, should be around 50 - 100 ma. Check for proper output power with a monitor scope if one is available.

5.2.2 CW Operation: Set the SSB/CW/RTTY switch to SSB/CW and tune the amplifier as above in 5.2.1.

5.2.3 AM Operation: SSB/CW/RTTY switch should be in RTTY position. Do not apply modulation. If not already tuned as per 5.2.2, tune the amplifier as per 5.2.1, Step 4 with plate current at 650 ma max. and grid current at approximately 200 ma. Reduce the carrier output so that plate current is 1/2 of previous reading. grid current will be approximately 100 ma. Apply 1000 Hz tone at 100% modulation. Plate current should not exceed previous maximum value. If it does, reduce the mic. gain, as necessary. If an oscilloscope or modulation monitor is available, check that the modulation does not exceed 100%.

5.2.4 RTTY Operation: SSB/CW/RTTY switch should be in RTTY position. The PT-2500A is designed to operate at the 1 kilowatt level continuously. If not already tuned for CW (5.2.2), tune the amplifier as per 5.2.4 Step 1 with plate current at 650 ma max and grid current at approximately 200 ma.

5.2.5 ALC Adjustment: Loosen the ALC control lock nut. The control should be in the minimum voltage, or clockwise position. Drive the amplifier to the desired output level and then rotate the ALC control (CCW) until the grid current just begins to decrease.

5.2.6 Power Readings: When the FWD push-button is depressed, the MULTIMETER reads the output power into a dummy load or antenna. The full scale reading is 2000 watts. When the REFL push-button is depressed, the MULTIMETER reads the reflected power. The full scale reading is 200 watts.

The amplifier should never be operated into a load with an SWR greater than 1.5:1, which represents approximately 5% reflected power. The SWR should be regularly checked when connected to an antenna. If VSWR of less than 1.5:1 cannot be achieved, Barker & Williamson Transmatch, Model VS 1500A, or equivalent, should be connected between the amplifier and the antenna.

5.2.6 Grid Protection Circuit: The PT-2500A is equipped with a grid protection circuit. If during tune up or normal operation a momentary grid current of 400 ma is exceeded, the amplifier will shut down and automatically switch to the bypass mode. The operate pilot lamp will be extinguished. To restore amplifier operation, reduce input drive to the unit, press the standby/operate switch to standby and then back to operate.

NOTE:

With the STANDBY/OPERATE switch in the STANDBY position, the exciter output will bypass the amplifier and feed directly to the antenna. The amplifier does not have to be off to accomplish this bypass.

Warranty

All goods sold hereunder are warranted to be free from defects in material and workmanship, for a period of one year from date of shipment, and this express warranty is in lieu of and excludes all other warranties whether expressed or implied by operation of law or otherwise including any warranty on the merchantability or fitness for a particular purpose. Defective material may be returned to the seller after inspection by the seller and upon receipt of definite shipping instructions by the seller. Goods so returned will be replaced or repaired without charge, but the seller shall not be liable for loss, damage or expense directly or indirectly arising from the use of material or from any other cause, the exclusive remedy against the seller being to require the replacement or repair of defective material. Every claim on account of defective material or workmanship or from any other cause shall be deemed waived by the purchaser unless made in writing prior to the expiry date of the warranty.

NOTE:

The 3-500Z tubes are warranteed on a one year pro-rata basis by the tube manufacturer. Any warranty claims must be accompanied by the tube warranty claim form packaged with your new tubes. All claims must be filed with tube manufacturer. Warranty claims on the amplifier must be accompanied by proof of purchase and purchase date.

Specifications and/or improvements subject to change without prior notice or obligation.

LIST OF REPLACEABLE PARTS

CAPACITORS

SYMBOL	DESCRIPTION	PART NO.
C1	MICA, 2634PF, 1000V	43-016
C2	MICA, 1000PF, 1000V	43-014
C3	MICA, 820PF, 1000V	43-001
C4	MICA, 47PF, 1000V	43-004
C6	MICA, 47PF, 500V	42-027
C7	MICA, 2710PF, 1000V	43-017
C8	MICA, 1068PF, 1000V	43-015
C9	SAME AS C2	
C10	MICA, 91PF, 1000V	43-005
C11	VARIABLE, 235PF, 6000V	45-006
C12	MICA, 100PF, 1000V	43-006
C13	FILM, 0.1MF, 250V	46-005
C14	CERAMIC, .01MF, 1400V	40-010
C15	SAME AS C13	
C16	SAME AS C14	
C17	SAME AS C14	
C18	SAME AS C14	
C19	MICA, 33PF, 500V	42-002
C20	MICA, 68PF, 500V	42-004
C21	FILM, .022MF, 400V	46-003
C22	FILM, .0068MF, 600V	46-004
C23	CERAMIC, .001MF, 1000V	40-004
C24	SAME AS C14	
C25	SAME AS C13	
C26	FILM, .01MF, 400V	46-002
C27	SAME AS C14	
C28	SAME AS C13	
C29	SAME AS C23	
C30	CERAMIC, 1000MF, 5000V	41-010
C31	SAME AS C30	
C32	CERAMIC, .01MF, 5000V	41-012
C33	CERAMIC, .001MF, 6000V	41-005
C34	CERAMIC, 40PF, 7500V	41-002
C35	SAME AS C34	
C36	MICA, 1200PF, 5000V	43-021
C37	VARIABLE, 1000PF, 2500V	45-007
C38	MICA, 10PF, 1000V	43-018
C39	VARIABLE, 2-22PF	45-002
C40	MICA, 220PF, 1000V	43-010
C41	CERAMIC, .01MF, 50V	40-007
C42	SAME AS C41	
C43	SAME AC C41	
C44	SAME AS C41	
C45	FILM, 0.1MF, 250V	46-001
C46	SAME AS C41	
C47	SAME AS C41	
C48	ELECTROLYTIC, 22MFD, 160V	44-001
C49	SAME AS C48	
C50	SAME AS C45	
C51	SAME AS C45	
C52	ELECTROLYTIC, 1000MFD, 10V	44-006
C53	SAME AS C29	
C54	SAME AS C29	
C55	SAME AS C29	
C56	SAME AS C29	
C57	SAME AS C29	
C58	SAME AS C29	
C59	ELECTROLYTIC, 210MFD, 450V	44-002
C60	SAME AS C59	
061	SAME AS C59	
C62	SAME AS C59	
C63	SAME AS C59	
C64	SAME AS C29	
C65	SAME AS C29	
C66	SAME AS C29	
C67	SAME AS C29	
C68	SAME AS C29	

SYMBOL	DESCRIPTION	PART NO.
C69	SAME AS C29	
C70	SAME AS C59	
C71	SAME AS C59	
C72	SAME AS C59	
C73	SAME AS C59	
C74	SAME AS C59	
C75	CERAMIC, .01MF 1000V	40-001
C76	SAME AS C45	
C77	CERAMIC, 100PF, 5000V	41-003
C78	SAME AS C77	

RESISTORS

R1	CARBON, 47 K OHMS, 1/4 W	20-013
R2	CARBON, 15 K OHMS, 1/4 W	20-012
R3	POTENTIOMETER,LOCKING, 100 K OHMS	15-004
R4	SAME AS R1	
	SAME AS R2	
R7	POTENTIOMETER, 250 K OHMS	15-006
R8	POTENTIOMETER, 50 K OHMS	15-005
R9	CARBON, 68 OHMS, 2 W	20-009
R10	WIREWOUND, 15 OHMS, 25 W	25-034
R11	CARBON, 1 M OHMS, 1/2 W	20-015
R12	SAME AS R11	
R13	SAME AS R11	
R14	SAME AS R11	
R15	SAME AS R11	
R16	SAME AS R11	
R17	WIREWOUND, 25 K OHMS, 10 W	25-026
R18	SAME AS R17	
R19	SAME AS R17	
R20	SAME AS R17	
R21	SAME AS R17	
	SAME AS R11	
R23	SAME AS R11	
R24	SAME AS R11	
R25	SAME AS R11	
R26	SAME AS R11	
R27	SAME AS R11	
R28	SAME AS R17	
R29	SAME AS R17	
R30	SAME AS R17	
R31	SAME AS R17	
R32	SAME AS R17	
R33	CARBON, 15 K OHMS, 5 W	25-024
R34	CARBON, 4.7 K OHMS,1/4 W	20-031
R35	POTENTIOMETER, 25 K OHMS	15-007
R36	WIREWOUND, 5 OHMS, 5 W	25-021
R37	POTENTIOMETER, 1 K OHMS	15-002
R38	CARBON, 220 OHMS, 1/4 W	20-001
R39	CARBON, 10 K OHMS, 5 W	25-023
R40	SAME AS R11	
R41	POTENTIOMETER, 10 K OHMS	15-003
R42	CARBON, 82 K OHMS, 1/4 W	20-008
R43	SAME AS R33	
R44	CARBON, 3.9 K OHMS, 1/4 W	20-030
R45	SAME AS R34	
R46	WIREWOUND 3 K OHMS, 5 W	25-020
VDR1	VARISTOR, 250 V	29-001
VDR2	SAME AS BDR1	

SEMICONDUCTORS

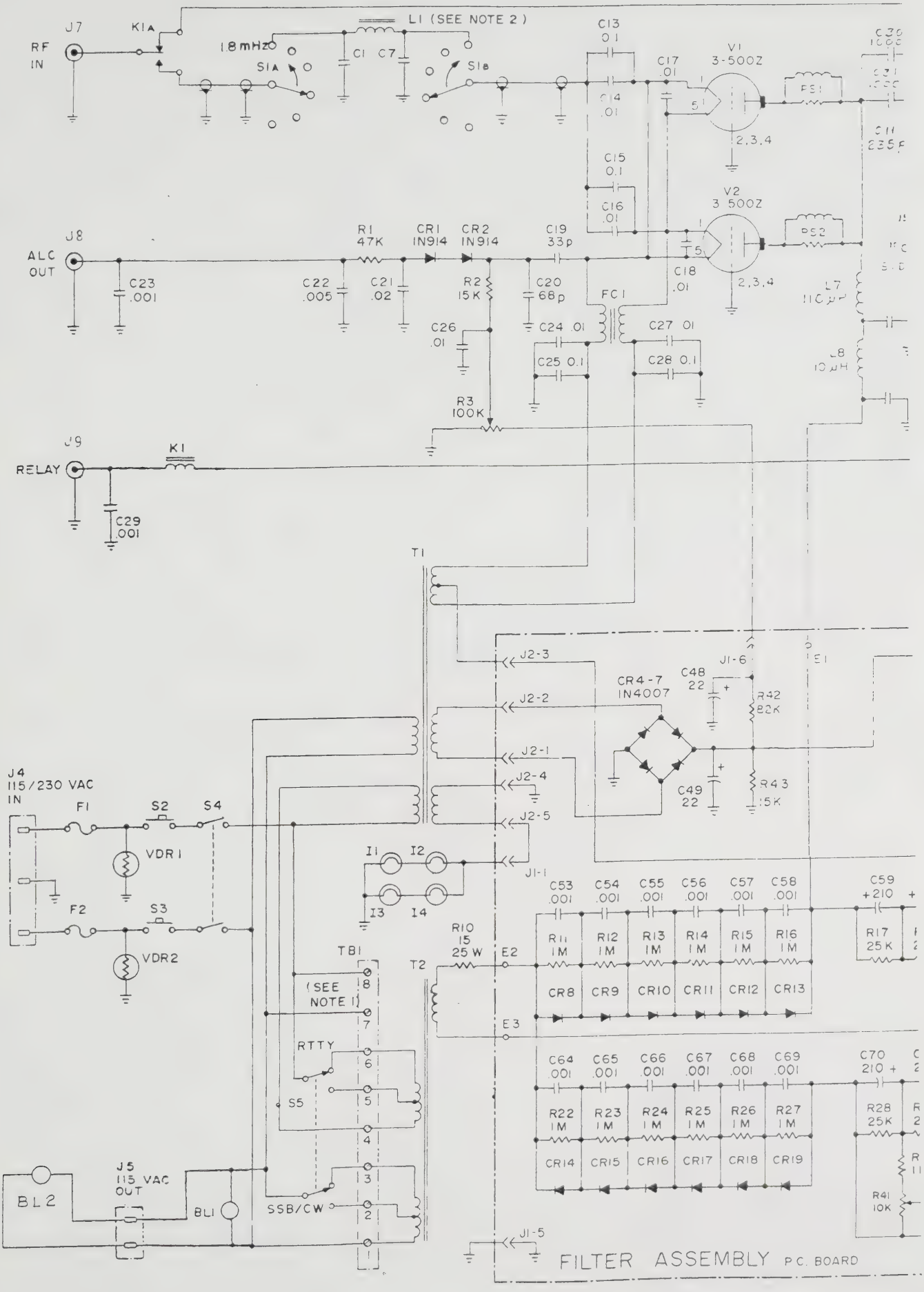
CR1	DIODE 1N4148	70-006
CR2	SAME AS CR1	
CR3	DIODE 1N4004	70-014
CR4	DIODE 1N4007	70-005
CR5	SAME AS CR4	
CR6	SAME AS CR4	
CR7	SAME AS CR4	
CR8 THROUGH CR19	DIODE MR510	70-007
CR21	DIODE 1N270	70-001
CR22	SAME AS CR21	

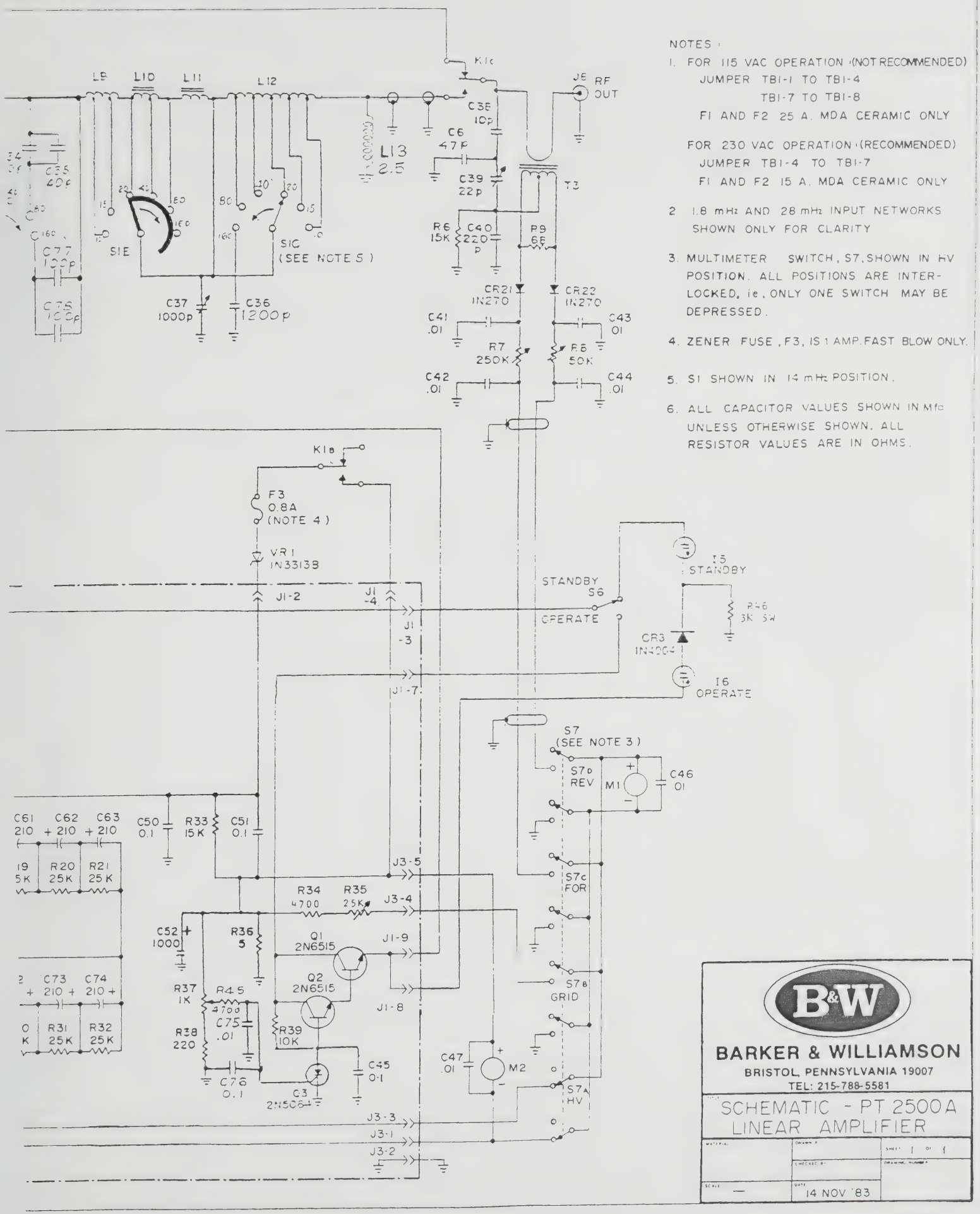
SYMBOL	DESCRIPTION	PART NO.
VR1	DIODE, ZENER, 1N3313B	70-003
Q1	TRANSISTOR, 2N6515	75-003
Q2	SAME AS Q1	
Q3	TRANSISTOR, SCR, 2N5064	75-002
	INDUCTORS AND TRANSFORMERS	
L1	INDUCTOR,TOROIDAL, 1.8 MHZ	62-023
L2	INDUCTOR,TOROIDAL, 3.5 MHZ	62-021
L3	INDUCTOR, INPUT, 7.0 MHZ	60-011
L4	INDUCTOR, INPUT, 14 MHZ	60-010
L5	INDUCTOR, INPUT, 21 MHZ	60-008
L6	INDUCTOR, SAME AS L5	
L7	PLATE CHOKE, 110 UH, 1000 MA	62-010
L8	R.F. CHOKE, 10 UH, 1.5 AMP	62-011
L9	INDUCTOR, 28/21/14 MHZ	60-004
L10	INDUCTOR, TOROIDAL, 7/3.5 MHZ	60-002
L11	INDUCTOR, TOROIDAL, 1.8 MHZ	60-001
L12	INDUCTOR, LOADING COIL	60-003
.13	R.F. CHOKE, 2.5 MH, 160 MA	62-009
FC1	FILAMENT CHOKE, 25 AMP.	62-008
T1	TRANSFORMER, FILAMENT, L V	H0-003
T2	TRANSFORMER, POWER, H V	H0-002
T3	TRANSFORMER, METER	62-030
PS1	PARASITIC SUPPRESSOR ASSY	63-001
PS2	SAME AS PS1	
	SWITCHES	
K1	RELAY, 3PDT, 120 VDC	80-005
S1AB	SWITCH, DP6T, ROTARY	B5-017
S1C.D.E	SWITCH, 3P6T, ROTARY, H V	B5-018
S2	SWITCH, SPDT, MICROSWITCH	B5-003
S3	SAME AS S2	
S4	SWITCH, DPDT, ROCKER, POWER	B5-009
S5	SWITCH, DPDT, ROCKER, MODE	B5-002
S6	SAME AS S5	
S7	SWITCH, PUSHBUTTON,4 SECTION,DPDT	B5-004

SYMBOL	DESCRIPTION	PART NO.
	CONNECTORS	
J1	RECEPTACLE, 9 PIN	C0-008
J2	RECEPTACLE (FILAMENT XFMR)	CO-006
J3	RECEPTACLE, 5 PIN	C0-007
J4	CONNECTOR, POWER, PLUG	C0-027
J5	CONNECTOR, BLOWER, SOCKET	CO-026
J6	CONNECTOR, UHF TYPE	C0-031
J7	CONNECTOR, UHF TYPE	CO-035
J8	CONNECTOR, PHONO TYPE	CO-033
J9	SAME AS J8	
	MISCELLANEOUS	
F1	FUSE,(230VAC),15 AMP, SLO BLO	79-014
	(115VAC),25 AMP, SLO BLO	79-015
F2	SAME AS F1	
F3	FUSE, 1A, FAST BLO	79-013
BL1	BLOWER, 115VAC, (INTERNAL)	90-002
BL2	BLOWER, 115VAC,(EXTERNAL)	90-003
V1	TUBE, 3-500Z	78-001
V2	SAME AS V1	
M1	METER, MULTIMETER	95-001
M2	METER, PLATE CURRENT	95-002
I1	PILOT LIGHT, 6V, TYPE 328	
I2	SAME AS I1	
I3	SAME AS I1	
I4	SAME AS I1	
I5	PILOT LIGHT,NEON,115V, RED	79-001
I6	PILOT LIGHT,NEON,115V,GREEN	79-002
W1	POWER CORD ASSEMBLY	CO-042
W2	CONTROL CABLE ASSEMBLY	CO-034
W3	SAME AS W2	
(NONE)	GLASS TUBE CHIMNEY	GO-200
TB1	TERMINAL BLOCK (XFMR)	CO-015
(NONE)	GUARD, EXTERNAL BLOWER	90-004

BARKER & WILLIAMSON

BRISTOL, PENNSYLVANIA 19007
TEL: 215-788-5581
TWX 510 667-1389


J7
RF IN
K1A
1.8 mHz
S1A
S1B
L1 (SEE NOTE 2)
C1
C7
C13 .01
C14 .01
C15 0.1
C16 .01
C17 .01
V1 3-500Z
V2 3-500Z
PS1
PS2
C30 1000
C31 1000
C11 235p
J8
ALC OUT
C23 .001
R1 47K
CR1 IN914
CR2 IN914
C19 33p
C22 .005
C21 .02
R2 15K
C20 68p
C26 .01
C24 .01
C25 0.1
C27 01
C28 0.1
FC1
C18 .01
L7 110μH
L8 10μH
R3 100K
J9
RELAY
K1
C29 .001
T1
J2-3
J2-2
J2-1
J2-4
J2-5
J1-6
CR4-7 IN4007
C48 22
R42 82K
C49 22
R43 15K
J4 115/230 VAC IN
F1
F2
S2
S3
S4
VDR1
VDR2
I1
I2
I3
I4
J1-1
C53 .001
C54 .001
C55 .001
C56 .001
C57 .001
C58 .001
C59 +210
R11 1M
R12 1M
R13 1M
R14 1M
R15 1M
R16 1M
R17 25K
CR8
CR9
CR10
CR11
CR12
CR13
TB1
(SEE NOTE 1)
RTTY
S5
SSB/CW
R10 15 25W
T2
E2
E3
C64 .001
C65 .001
C66 .001
C67 .001
C68 .001
C69 .001
C70 210
R22 1M
R23 1M
R24 1M
R25 1M
R26 1M
R27 1M
R28 25K
R41 10K
CR14
CR15
CR16
CR17
CR18
CR19
J5 115 VAC OUT
BL2
BL1
J1-5
FILTER ASSEMBLY P.C. BOARD



NOTES :

1. FOR 115 VAC OPERATION (NOT RECOMMENDED)
   JUMPER TB1-1 TO TB1-4
   TB1-7 TO TB1-8
   F1 AND F2 25 A. MDA CERAMIC ONLY

   FOR 230 VAC OPERATION (RECOMMENDED)
   JUMPER TB1-4 TO TB1-7
   F1 AND F2 15 A. MDA CERAMIC ONLY

2. 1.8 mHz AND 28 mHz INPUT NETWORKS SHOWN ONLY FOR CLARITY

3. MULTIMETER SWITCH, S7, SHOWN IN HV POSITION. ALL POSITIONS ARE INTERLOCKED, ie, ONLY ONE SWITCH MAY BE DEPRESSED.

4. ZENER FUSE, F3, IS 1 AMP. FAST BLOW ONLY.

5. S1 SHOWN IN 14 mHz POSITION.

6. ALL CAPACITOR VALUES SHOWN IN Mfd UNLESS OTHERWISE SHOWN. ALL RESISTOR VALUES ARE IN OHMS.

B&W

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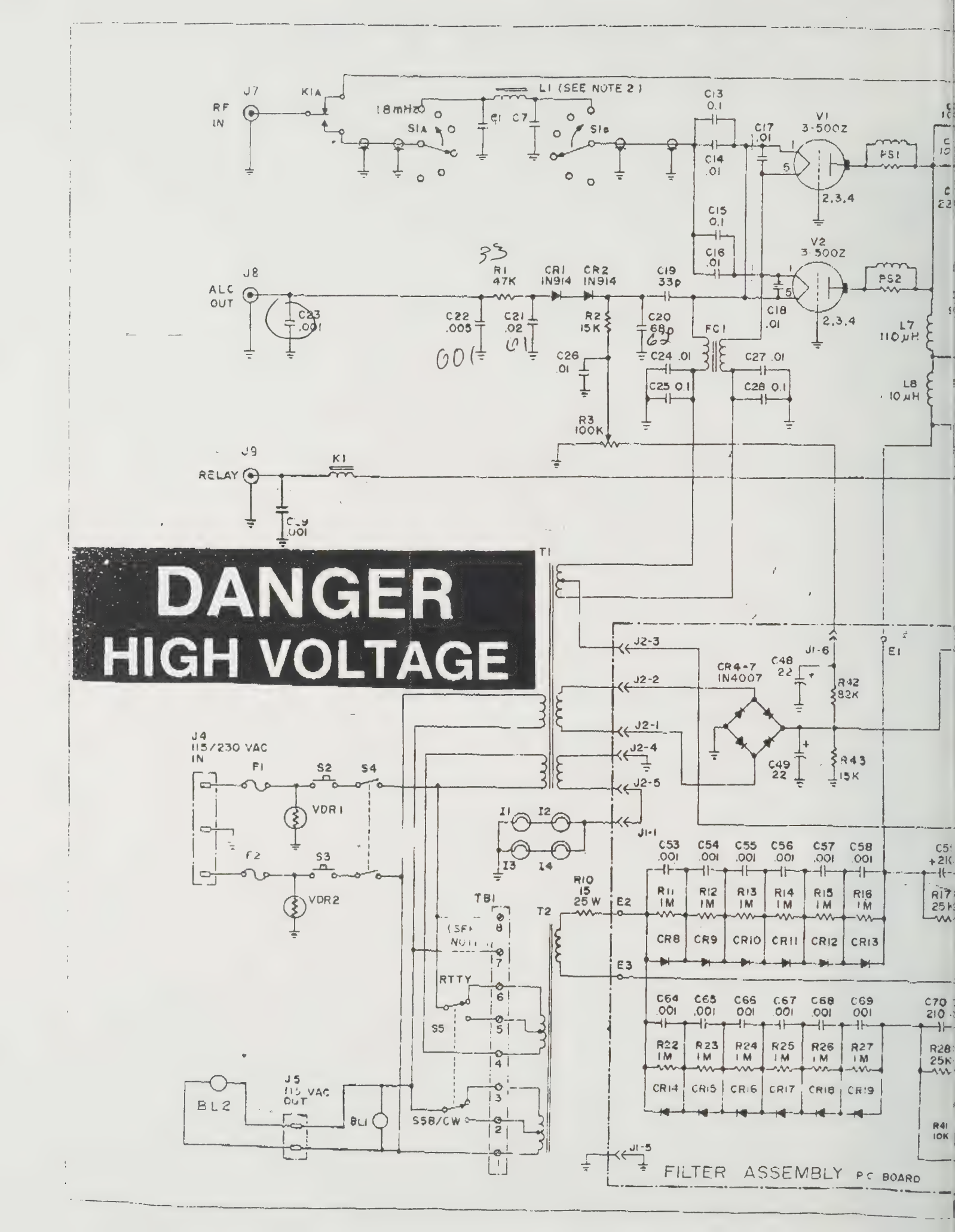
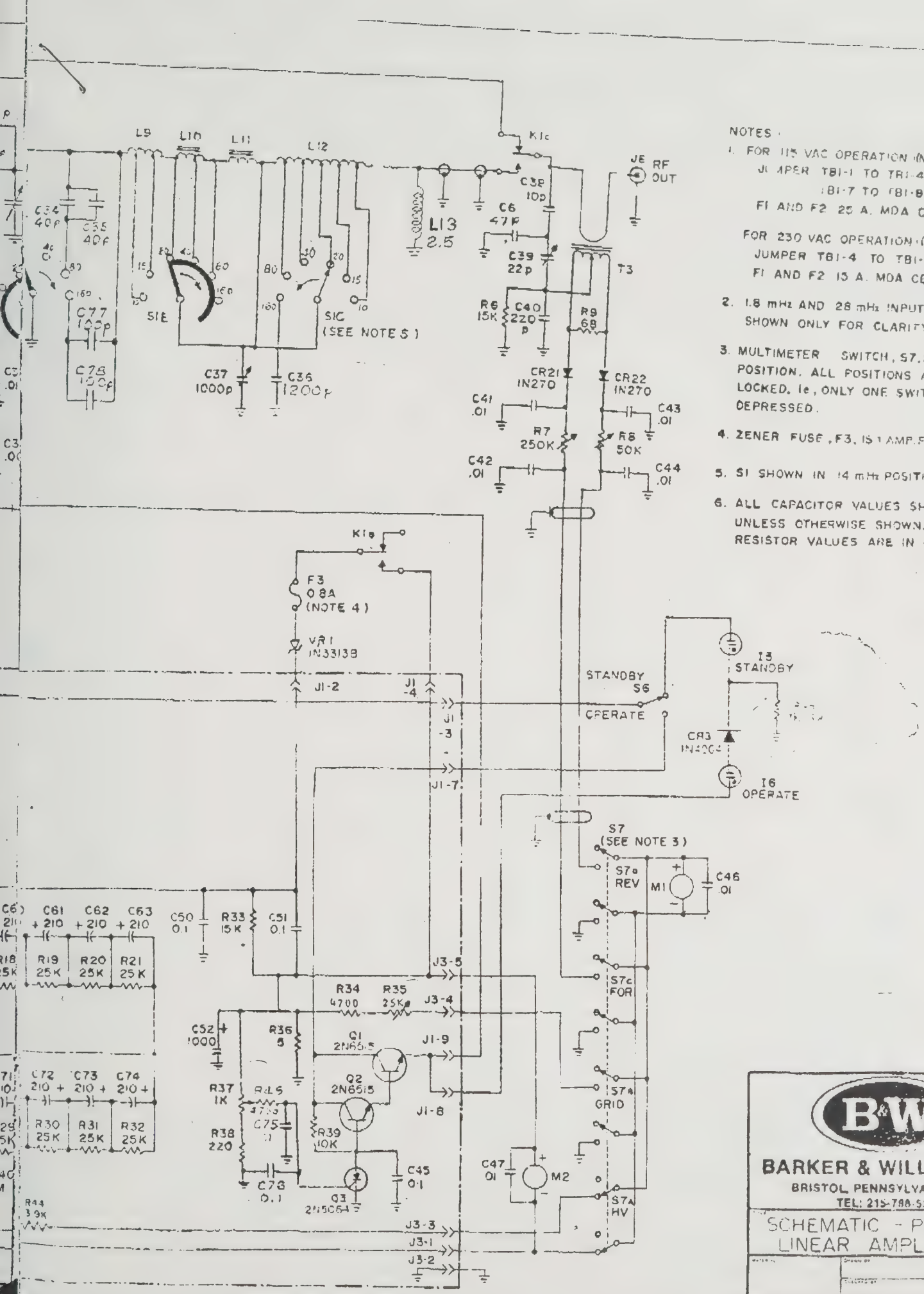
TEL: 215-788-5581

SCHEMATIC - PT 2500A
LINEAR AMPLIFIER

MATERIAL	DRAWN BY	SHEET 1 OF 1
	CHECKED BY	DRAWING NUMBER
SCALE —	DATE 14 NOV '83	


DANGER
HIGH VOLTAGE
J7
RF IN
K1A
18mHz
S1A
S1B
L1 (SEE NOTE 2)
C13 0.1
C17 .01
C14 .01
V1 3-500Z
PS1
C15 0.1
C16 .01
V2 3-500Z
PS2
J8
ALC OUT
C23 .001
R1 47K
CR1 IN914
CR2 IN914
C19 33p
C22 .005
C21 .02
R2 15K
C20 68p
FC1
C18 .01
L7 110μH
L8 .10μH
C26 .01
C24 .01
C27 .01
C25 0.1
C28 0.1
R3 100K
J9
RELAY
K1
T1
J2-3
J2-2
J2-1
J2-4
J2-5
J1-6
E1
CR4-7 IN4007
C48 22
R42 82K
C49 22
R43 15K
J4 115/230 VAC IN
F1
S2
S4
VDR1
F2
S3
VDR2
I1
I2
I3
I4
J1-1
C53 .001
C54 .001
C55 .001
C56 .001
C57 .001
C58 .001
R11 1M
R12 1M
R13 1M
R14 1M
R15 1M
R16 1M
CR8
CR9
CR10
CR11
CR12
CR13
R17 25K
TB1
T2
R10 15 25W
E2
E3
(SEE NOTE)
RTTY
S5
SSB/CW
C64 .001
C65 .001
C66 001
C67 .001
C68 .001
C69 001
R22 1M
R23 1M
R24 1M
R25 1M
R26 1M
R27 1M
CR14
CR15
CR16
CR17
CR18
CR19
R28 25K
R41 10K
J5 115 VAC OUT
BL2
BL1
J1-5
FILTER ASSEMBLY PC BOARD



NOTES :

1. FOR 115 VAC OPERATION (NOT RECOMM...
   JUMPER TB1-1 TO TB1-4
   TB1-7 TO TB1-8
   F1 AND F2 25 A. MDA CERAMIC ONL...

   FOR 230 VAC OPERATION (RECOMMENDE...
   JUMPER TB1-4 TO TB1-7
   F1 AND F2 15 A. MDA CERAMIC ONL...
2. 1.8 mHz AND 28 mHz INPUT NETWORKS SHOWN ONLY FOR CLARITY
3. MULTIMETER SWITCH, S7, SHOWN IN H... POSITION. ALL POSITIONS ARE INTER... LOCKED, Ie, ONLY ONE SWITCH MAY BE DEPRESSED.
4. ZENER FUSE, F3, IS 1 AMP. FAST BLOW ...
5. S1 SHOWN IN 14 mHz POSITION.
6. ALL CAPACITOR VALUES SHOWN IN M... UNLESS OTHERWISE SHOWN. ALL RESISTOR VALUES ARE IN OHMS.

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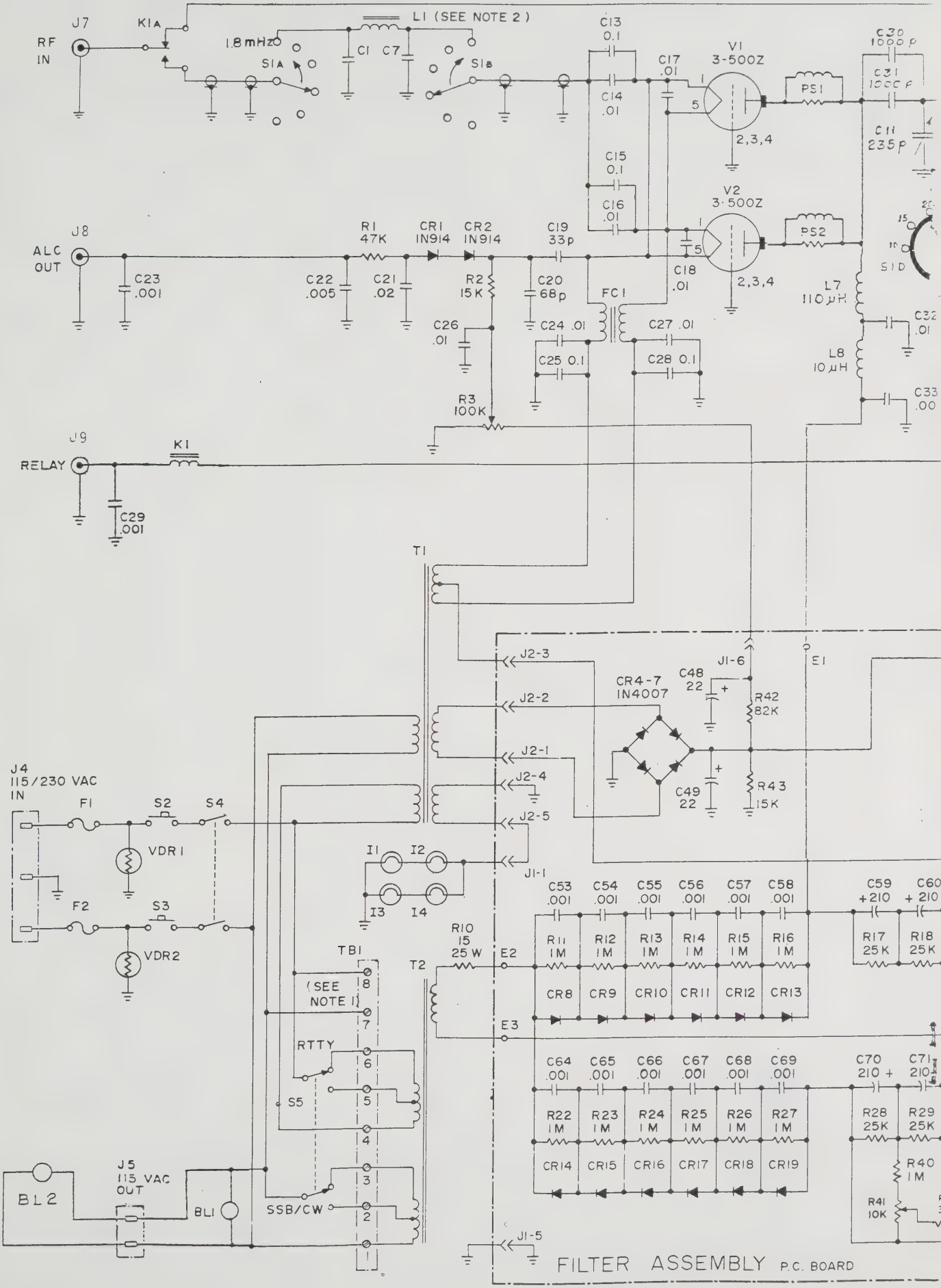
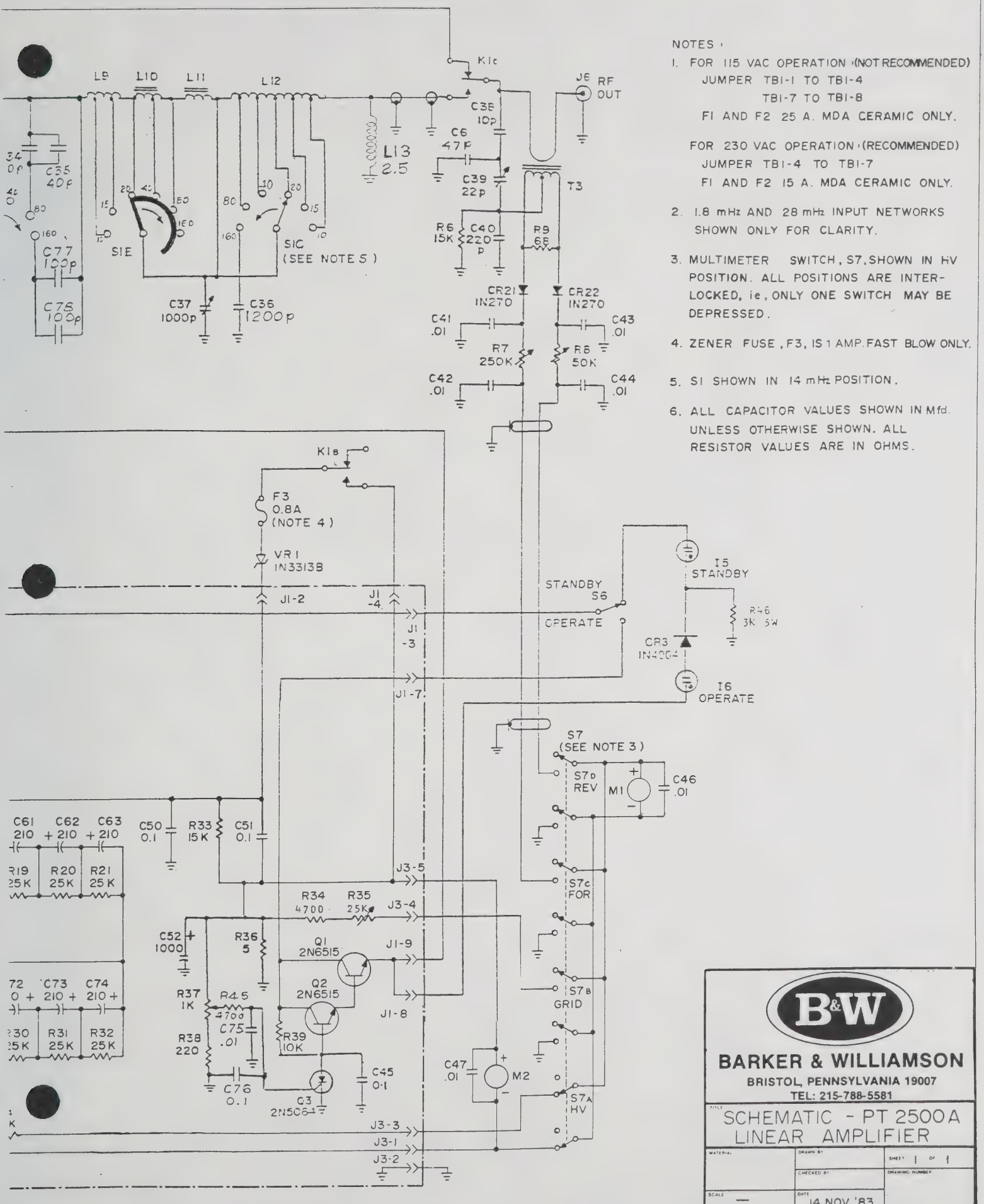
SCHEMATIC - PT 2500A
LINEAR AMPLIFIER


J7
RF IN
K1A
1.8 mHz
S1A
S1B
L1 (SEE NOTE 2)
C1
C7
C13 0.1
C14 .01
C17 .01
V1 3-500Z
2,3,4
PS1
C30 1000 p
C31 1000 p
C11 235p
C15 0.1
C16 .01
V2 3-500Z
PS2
J8
ALC OUT
C23 .001
R1 47K
CR1 IN914
CR2 IN914
C19 33p
C22 .005
C21 .02
R2 15K
C20 68p
FC1
C18 .01
L7 110 µH
L8 10 µH
C32 .01
C33 .00
S1D
C26 .01
C24 .01
C27 .01
C25 0.1
C28 0.1
R3 100K
J9
RELAY
K1
C29 .001
T1
J2-3
J2-2
J2-1
J2-4
J2-5
J1-6
E1
CR4-7 IN4007
C48 22
R42 82K
C49 22
R43 15K
J4 115/230 VAC IN
F1
S2
S4
VDR1
F2
S3
VDR2
I1
I2
I3
I4
J1-1
C53 .001
C54 .001
C55 .001
C56 .001
C57 .001
C58 .001
C59 +210
C60 + 210
R11 1M
R12 1M
R13 1M
R14 1M
R15 1M
R16 1M
R17 25K
R18 25K
CR8
CR9
CR10
CR11
CR12
CR13
R10 15 25 W
E2
E3
TBI
T2
(SEE NOTE 1)
RTTY
S5
SSB/CW
C64 .001
C65 .001
C66 .001
C67 .001
C68 .001
C69 .001
C70 210 +
C71 210
R22 1M
R23 1M
R24 1M
R25 1M
R26 1M
R27 1M
R28 25K
R29 25K
R40 1M
R41 10K
CR14
CR15
CR16
CR17
CR18
CR19
J5 115 VAC OUT
BL2
BL1
J1-5
FILTER ASSEMBLY P.C. BOARD



NOTES :

1. FOR 115 VAC OPERATION (NOT RECOMMENDED)
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TEL: 215-788-5581

TITLE: SCHEMATIC - PT 2500A LINEAR AMPLIFIER

MATERIAL	DRAWN BY	SHEET 1 OF 1
	CHECKED BY	DRAWING NUMBER
SCALE —	DATE 14 NOV. '83	

INSTRUCTION MANUAL

Model 600

Dip Meter

Serial No. 1998

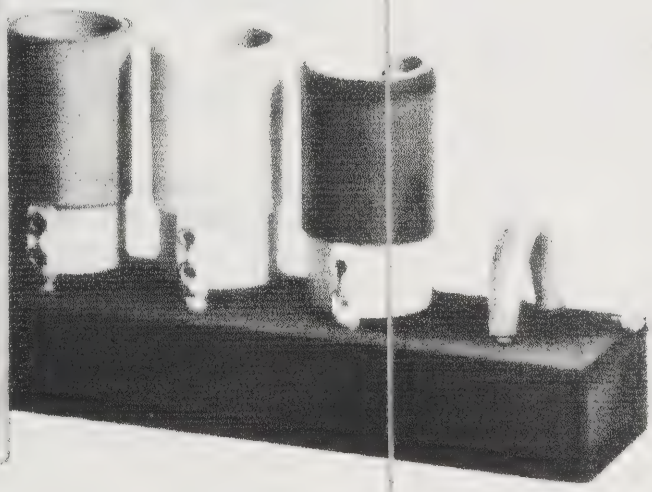
BARKER & WILLIAMSON, Inc.

237 Fairfield Avenue • Upper Darby, Penna.

B&W

MODEL 600

Dip Meter



SPECIFICATIONS

Frequency Range	1.75 to 260 MC with 5 overlapping color coded plug-in coils
Dimensions	Approximately 3" x 3" x 7"
Weight	Approximately 2 lbs.
Power Supply	115 volts AC. 60 cycles
Tube	955 Acorn type
Meter	0-500 microamperes
Finish	Hammeroid gray

Coil Set No. 600-A

Coil No.	Frequency Range	Color Code
600–A–1	1.75 to 5.2 mc	Green
600–A–2	5 to 14 mc	White
600–A–3	14 to 36 mc	Yellow
600–A–4	36 to 95 mc	Blue
600–A–5	95 to 260 mc	Red

WARNING

DEATH OR SERIOUS INJURY MAY RESULT IF OPERATORS FAIL TO OBSERVE SAFETY PRECAUTIONS.

EXTREME *CAUTION* IS TO BE EXERCISED DURING MEASUREMENTS AROUND LIVE POWER CIRCUITS CARRYING *LETHAL VOLTAGES.

KEEP A SAFE DISTANCE BETWEEN THE CIRCUIT UNDER TEST AND THE INSTRUMENT PROBING COIL.

AVOID CLOSE COUPLING TO HIGH R.F. POTENTIAL CIRCUITS.

FAILURE TO OBSERVE THESE PRECAUTIONS MAY NOT ONLY RESULT IN A DAMAGED INSTRUMENT, BUT MAY RESULT IN PERSONAL INJURY, IF NOT LOSS OF LIFE.

*Underwriters regulations consider any potential above 24 volts, lethal.

INTRODUCTION

The B & W Model 600 Dip Meter is a sensitive, accurate and versatile electronic instrument. Few devices will prove so handy in so many ways in the laboratory, ham shack, and radio-TV service shop.

The Model 600 consists of a compact, highly sensitive oscillator circuit utilizing a type 955 acorn tube powered from a 115 volt 60 cycle AC. line through the medium of a transformer and metallic rectifier.

A rust proof chassis and sturdy aluminum case contribute in making this unit rugged, light in weight and virtually impervious to the effects of normal climatic conditions.

Five sturdily constructed color coded plug-in coils are furnished with each instrument. Colored vinyl bands on the coils serve as a means of identifying each coil, and further match the colored ranges of the instrument dial.

The panel plate is of richly reverse etched aluminum, designed to withstand the wear of hard service.

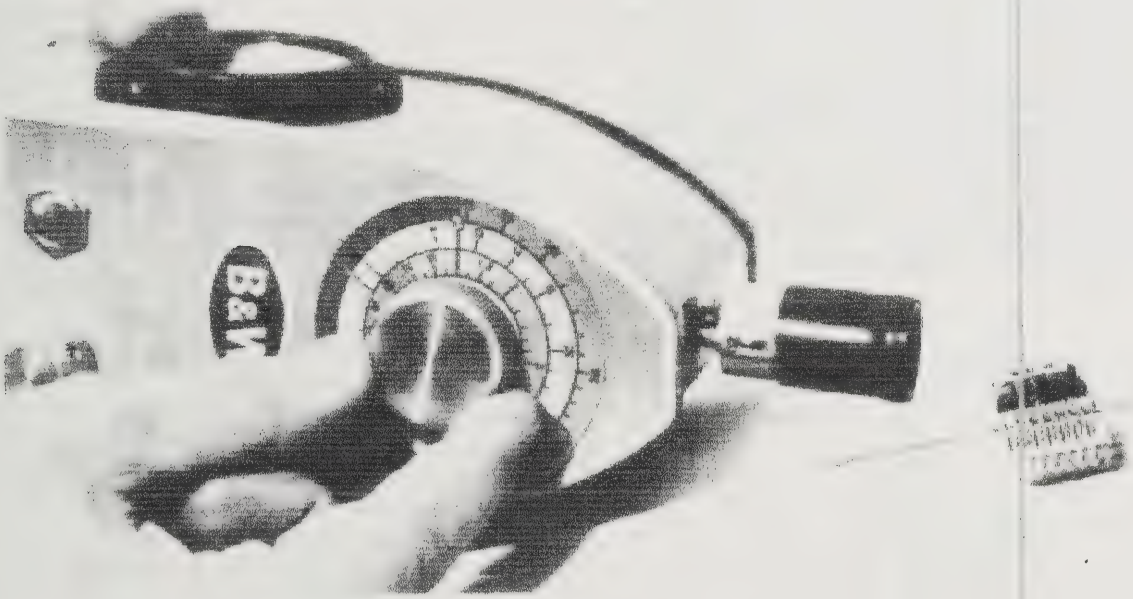
An adjustable sensitivity control permits adjustment of the meter to a suitable scale reading.

This simple, accurate and indispensable instrument is capable of saving the engineer, ham operator and service man much valuable time.

PUTTING THE INSTRUMENT INTO SERVICE

The instrument when shipped from the factory is complete with five color coded plug-in coils in a separate container box, a 955 acorn type tube which is already in place within the instrument, and an instruction book. The instrument when taken from its packing carton is ready for service.

To place the instrument in operation, insert the line cord plug into an AC. outlet delivering 115 volts 60 cycles single phase power, and turn the sensitivity control knob clockwise to turn power on. With the diode switch in the off position and a coil in place, a reading on the meter scale adjusted by the sensitivity control will indicate that the instrument is functioning and ready for service.



A MINIDUCTOR TRAP

The Model 600 is shown during the process of tuning a small trap circuit utilizing a B & W Miniductor coil and a compression type trimmer capacitor.

It may be similarly used for finding the resonant frequency of chokes and filters.

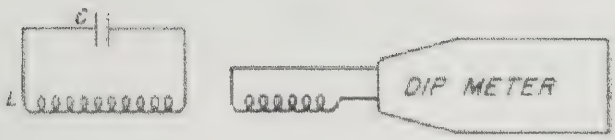


FIGURE 1

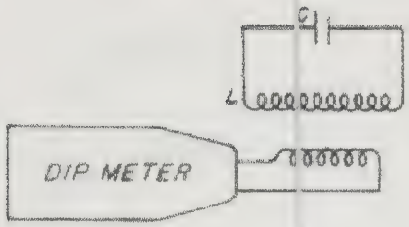


FIGURE 2

APPLICATIONS

DIP METER (Diode Switch "Off")

L C Circuits

The main function of the instrument, when used as a dip meter, is to indicate the resonant frequency of a tuned circuit. This is done by placing the coil of the instrument in close inductive relation to the coil of the circuit being measured, and rotating the tuning knob until a sharp dip is noted in the meter. See figures (1) and (2). The sensitivity control is used to keep the meter reading approximately in mid scale. When the position of the meter dip is ascertained, the coil distance is increased until the dip is barely discernible. The frequency of the circuit being measured is then read from the appropriate scale.

The above procedure is used in finding the resonant frequency of:

1. Traps and chokes
2. Tank circuits
3. I. F. circuits
4. R. F. circuits
5. Filters (high, low and band-pass) etc.

After the resonant frequency of a tuned circuit has been determined, the inductance or capacity may be found if one or the other is known. The nomograph (see Fig. 8) relating inductance, capacity and frequency has been prepared to facilitate this procedure. Known values of capacity can be purchased for use as standards, or established by the use of known values of inductance. An inexpensive source of inductance that can be easily trimmed and adjusted is the B&W Miniductor series. They are made in a number of inductance values as shown in the Miniductor inductance chart on Pages 8 and 9.

Note that the approximate "Q" or quality of resonant circuits may be compared by observing the sharpness of the meter dip as the condenser is rotated through resonance. A sharp dip indicates a circuit of higher "Q" than one with a broad dip.

When using the instrument at the extreme end of the highest frequency range, near 260 megacycles a spurious dip may be noticed that should not be confused with a resonance of the circuit under test.

Antennas and Transmission Lines

Antennas and transmission lines differ from ordinary lumped LC circuits in that the inductance and capacity is distributed. It is important to remember that more than one resonant frequency is present which must be taken into consideration. It is advantageous to determine in advance the approximate frequencies of interest and sketch the antenna and transmission line set-up in terms of current distribution.

Generally, the resonant frequency of an antenna is measured by coupling the coil of the instrument to the part of the antenna with a current maximum. Although points of voltage maximum may be used, they are best avoided due to the increased possibility of spurious dips. See figures (3),

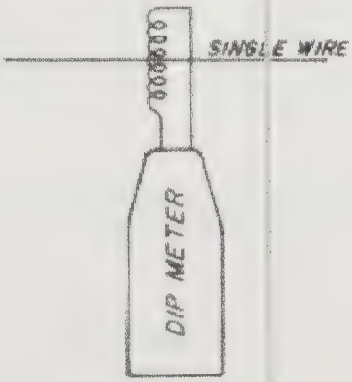


FIGURE 3

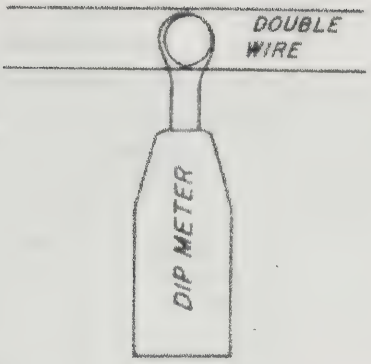


FIGURE 4

(4), (5) and (6). The adjustment of the instrument is then the same as for LC circuits. For example, the half wave antenna has a current maximum at the center. The driven element in a beam antenna is ordinarily a half wave. When its frequency is to be determined, it is necessary to disconnect all feeders and short out all breaks so introduced.

An antenna may also be operated on any multiple of its fundamental frequency. When this operation is desired, it is clarifying to sketch the current variation along the length of the antenna and make the frequency determination at one of the points of current maximum. For this frequency determination, it is also necessary to disconnect all transmission lines and short out any breaks.

The resonant frequency of a transmission line may be measured by considering it as similar to the folded section of an antenna. The instrument is coupled to a shorted end of the transmission line and measurement made as for an LC circuit. A sketch of the probable current distribution is helpful in determining the harmonic mode of operation. See figure (7). For instance, a one quarter wave transmission line with the far end open is similar to a half wave antenna and resonances will be found approximately at odd multiples of the fundamental frequency. When a transmission line is shorted at the far end, it may be considered as two quarter wave transmission lines placed back to back. The resonant frequency is then approximately twice that found with the far end open.

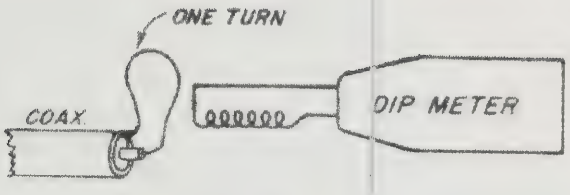
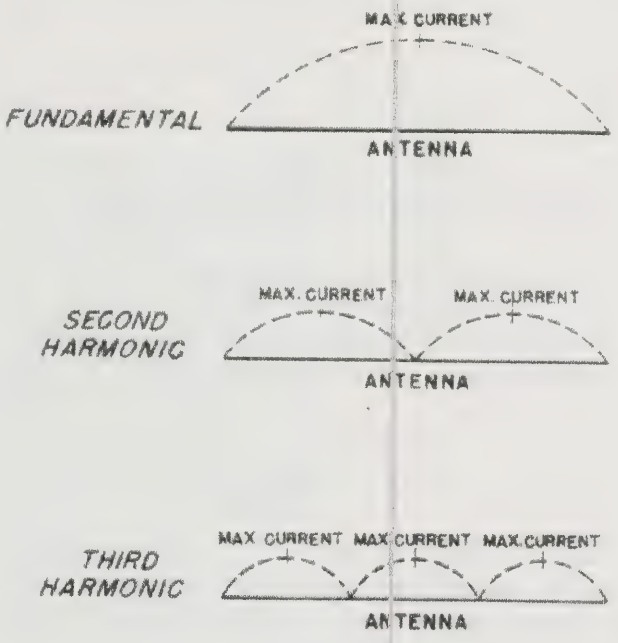


FIGURE 5

When the transmission line is terminated in a pure resistance equal to its characteristic impedance, it will be found that the resonances will disappear. Any other load will cause resonances to reappear except at those frequencies at which the load on the transmission line is equal to its characteristic impedance. These facts can be used to load a transmission line to a high degree of accuracy.



EXAMPLES OF RESONANT ANTENNA CURRENT DISTRIBUTIONS

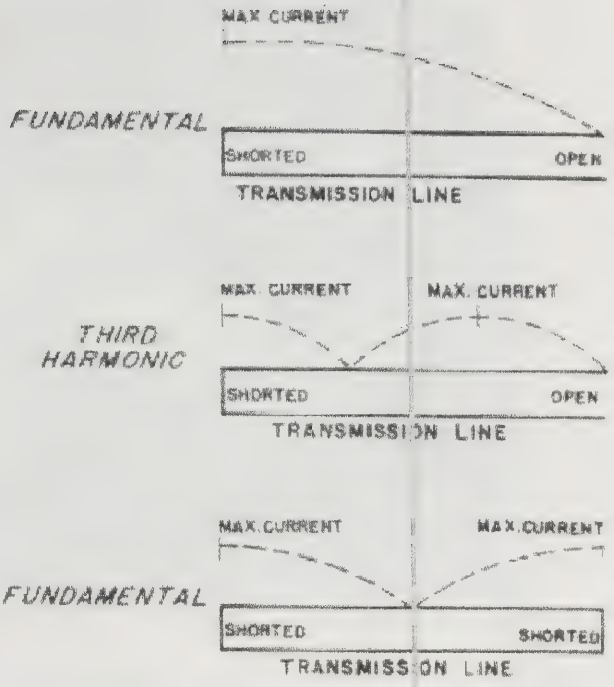
FIGURE 6

Signal Generator

The instrument can be used as a source of signal in the preliminary alignment of receivers. The amount of pickup by the receiver is varied by adjusting the position or distance of the instrument. The output signal is unmodulated, so that an R.F. type of signal tracer is necessary for indicating the proper alignment of the tuned circuits. The "S" meter, in some receivers, may be used as an indicating device for alignment.

The instrument is a convenient source of marker signals in the approximate adjustment of television circuits when using a sweep generator. In this case also, the intensity of the marker may be varied by adjusting the position or distance of the instrument from the circuit under test.

For isolation, markers and test signals may be fed to various circuits by means of a transmission line. The input end of the transmission line should be shorted with a loop that is lightly coupled to the coil of the instrument. The output of the transmission line is then fed into the equipment under investigation by any convenient means.



EXAMPLES OF RESONANT TRANSMISSION LINE CURRENT DISTRIBUTIONS

FIGURE 7

SIGNAL INTENSITY METER AND MONITOR

(Diode Switch "On")

In this case, the instrument functions as an R.F. pickup device where the meter deflection is proportional to the signal picked up by the coil. The sensitivity may be increased by coupling the coil of the dip meter to an antenna.

As a signal intensity meter, the instrument is useful in:

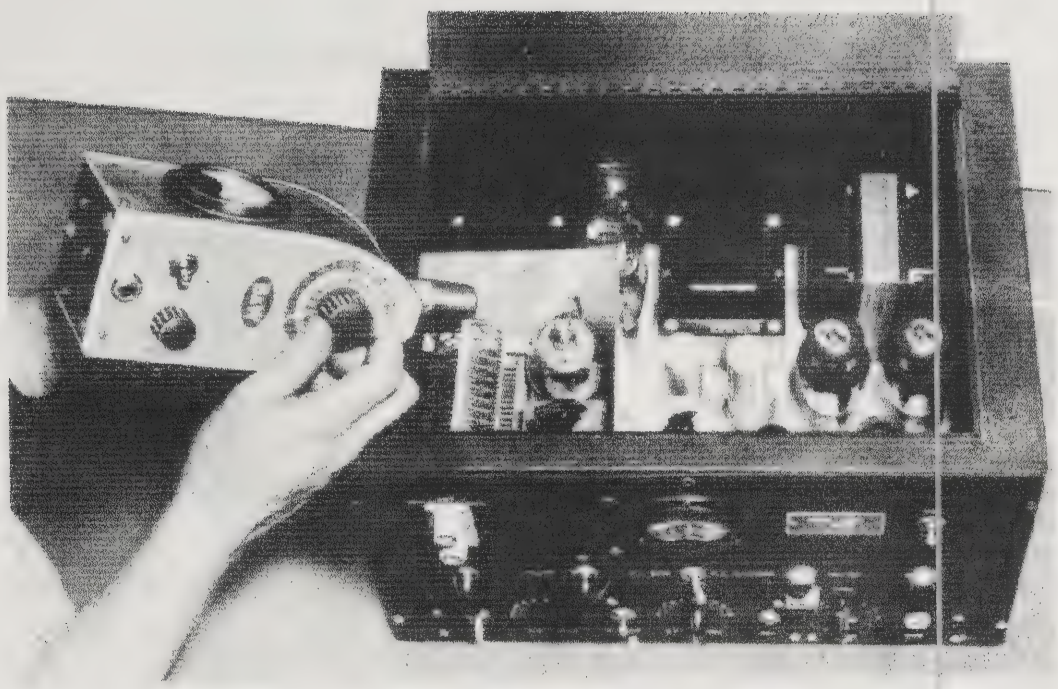
1. Relative field strength measurements
2. Neutralization
3. Harmonic and parasitic analysis
4. Investigation of standing waves on open transmission lines.

Inserting a phone plug into the "phone" jack disconnects the meter and enables the modulation on the signal to be monitored. The instrument may then be used for the determination of:

1. Hum and noise
2. Distortion
3. Quality

When using crystal head phones, place a 10,000 ohm resistor in parallel with them so that a DC path is provided to ground.

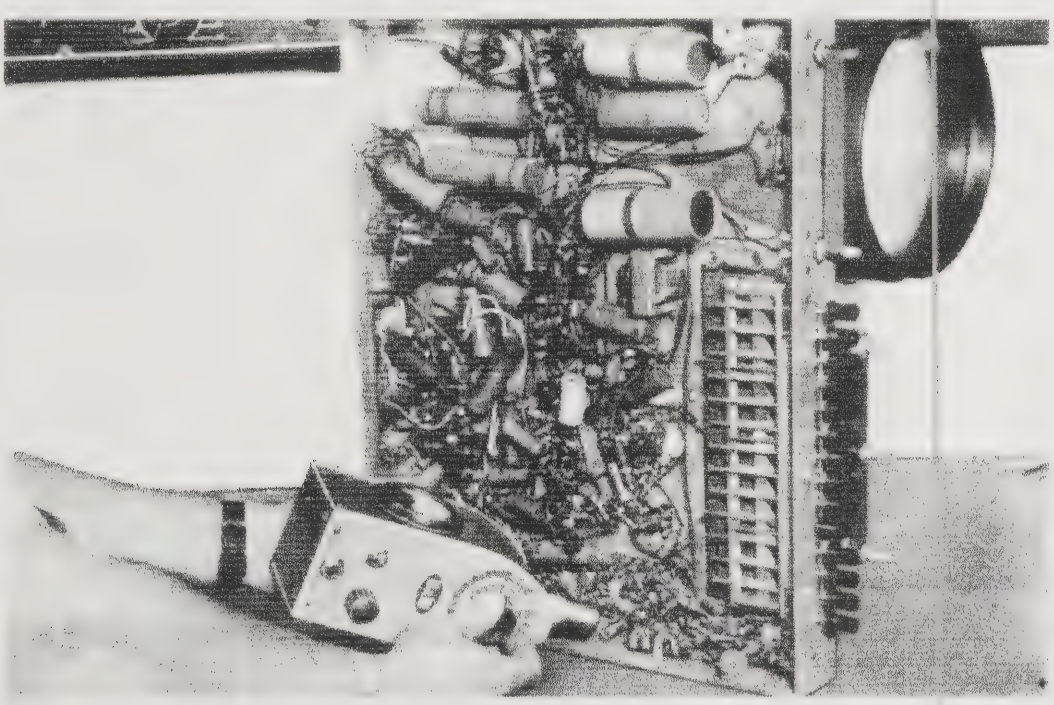
★ ★ ★



HAM TRANSMITTER

Here the Model 600 is shown performing one of its many and useful services in the ham shack. It may be further used to neutralize the transmitter, locate spurious oscillations and their frequencies, pretune all stages and as a field strength meter.

As a monitor it is indispensable for audible observation of hum level, noise, quality and general characteristics of the signal.

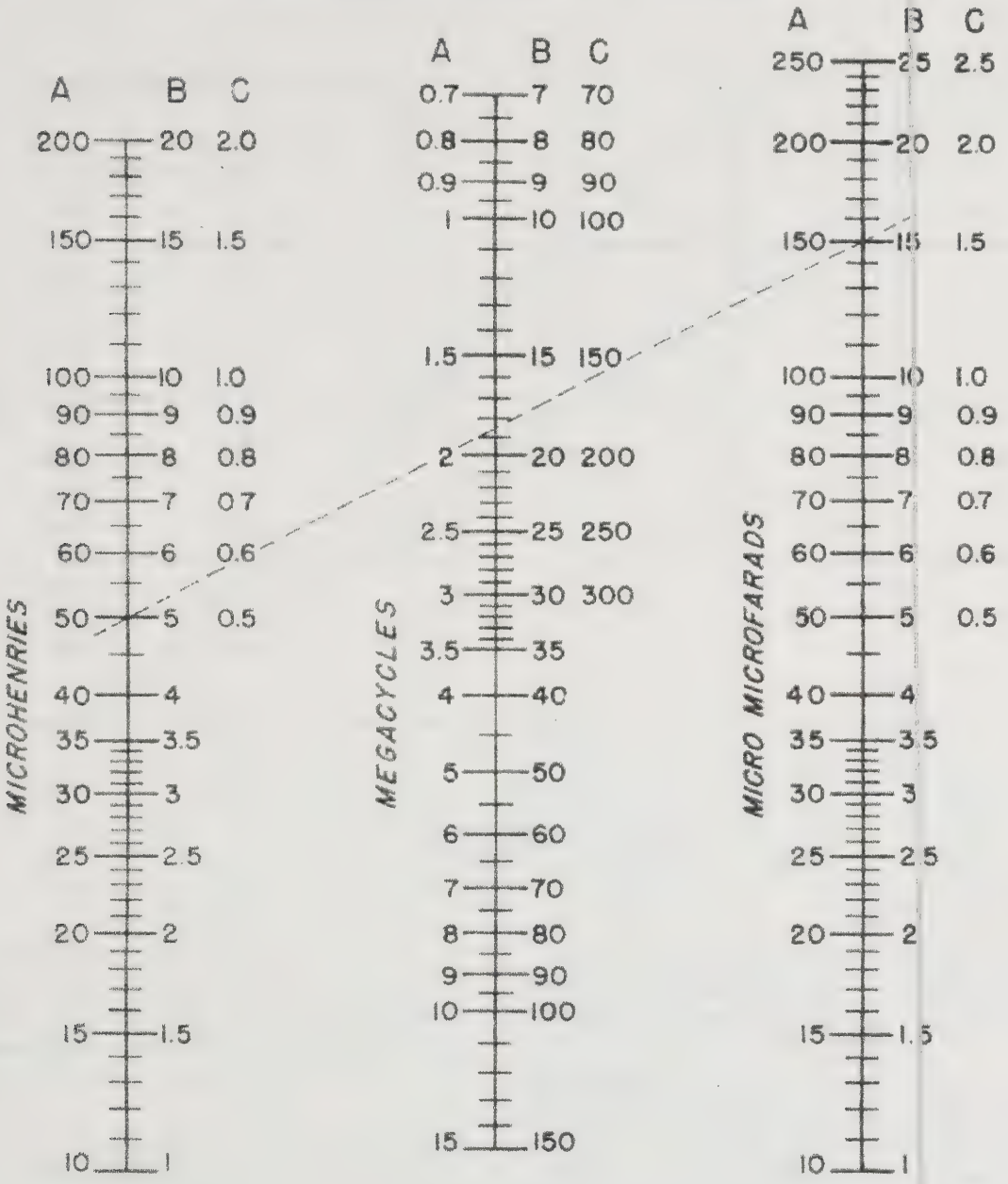


SERVICE SHOP

The preliminary alignment of the I.F. circuits in a TV receiver is shown in this photograph.

The Model 600 is also a valuable aid in the high frequency alignment of radio receivers of the all-band type. In service work it is useful in the alignment of R.F. and I.F. circuits, and as an auxiliary signal generator.

NOMOGRAPH
FOR
INDUCTANCE – FREQUENCY – CAPACITY



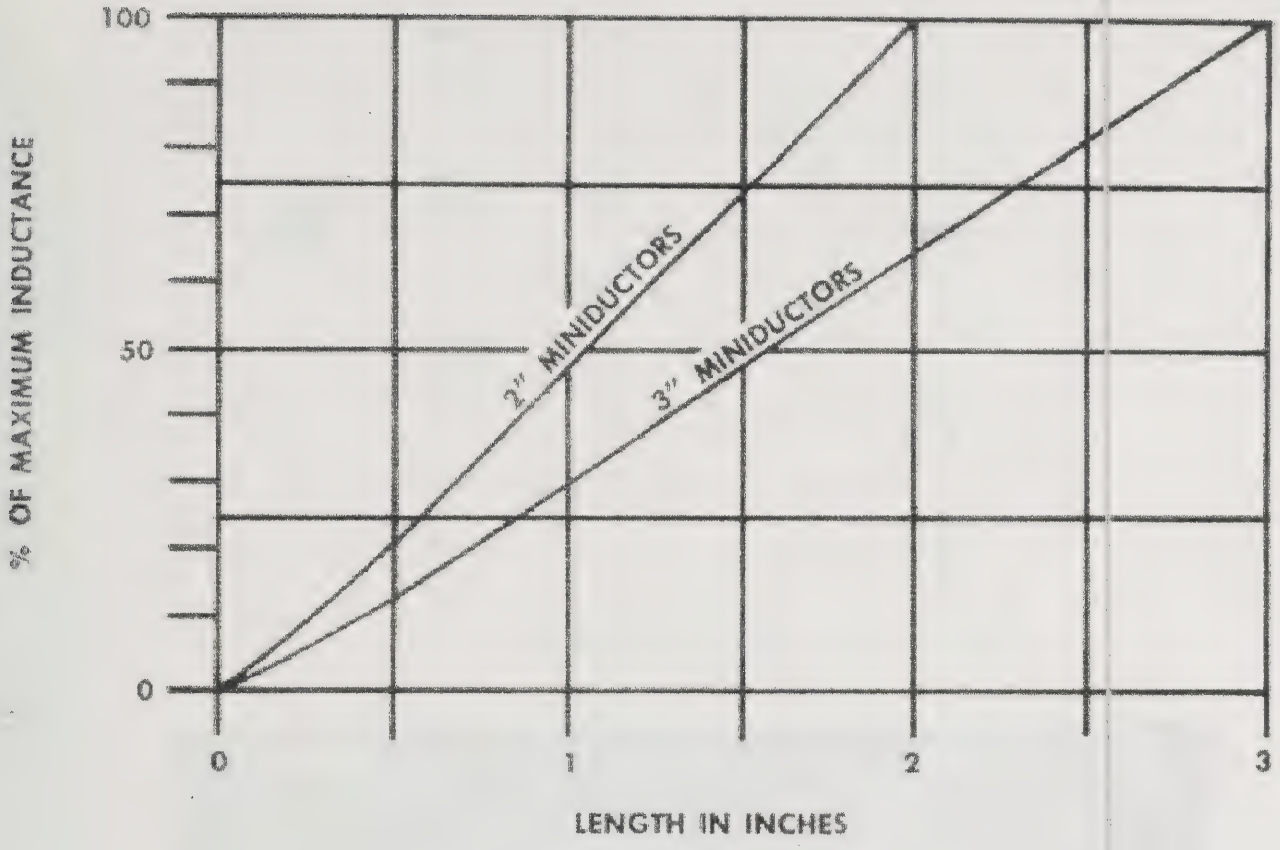
NOTE: *SCALES LETTERED "A" ARE USED TOGETHER, AS ARE SCALES "B" AND "C". IN USE, PLACE A STRAIGHT LINE BETWEEN ANY TWO KNOWN VALUES TO FIND THE THIRD.*

EXAMPLE: (NOTE DOTTED LINE) *USING SCALE "A*

INDUCTANCE = 50 MICROHENRIES
FREQUENCY = 1.85 MEGACYCLES
CAPACITY = 150 MICRO MICROFARADS

FIGURE 8

PROPORTIONAL INDUCTANCE OF MINIDUCTORS VS. LENGTH



This reprint of a graph indicating proportion of inductance versus length of Miniductors will be useful for determining the approximate value of inductance remaining after a standard length has been cut.

Here is an example on how to use the graph for determining inductance versus length. These formulae apply to all Miniductors.

EXAMPLE:—Let us determine the approximate inductance value of a 1" section of Miniductor #3012 whose length is three inches and total inductance value is 24.0 Microhenries. By referring to the graph, we find that a one inch length of Miniductor coincides with the 3 inch curve at a point representing 27% of the total length. 27% of 24μh = 6.48μh.

Should the inductance value required for a given application be known, the reverse of the above procedure would apply.

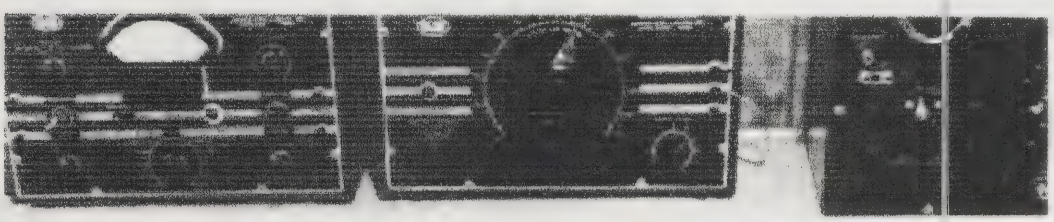
EXAMPLE:—A small coil having an inductance value of 6.48μh is required. Assuming that a #3012 Miniductor is at hand, whose total inductance value we know is approximately 24μh, we arrive at the length by first learning the percentage of 6.48μh to 24μh or 6.48 ÷ 24 = 27%.

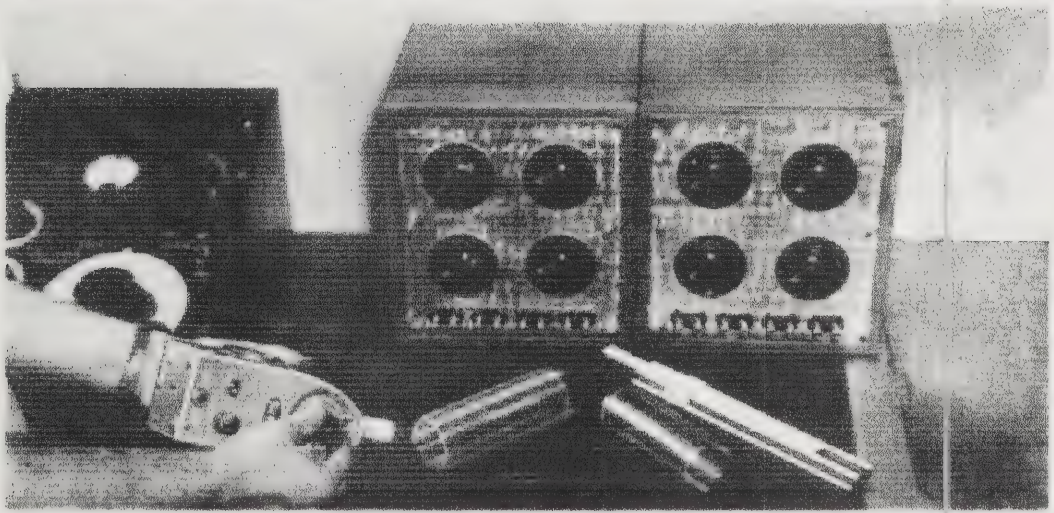
Due to possible inaccuracy in cutting, plus other variable factors beyond control, the resultant value of inductance remaining after a standard length of Miniductor has been trimmed, may be considered as approximate only.

CAUTION:—In trimming or cutting Miniductors, be sure to allow at least one extra turn on each end for lead lengths.

MINIDUCTOR SPECIFICATIONS

Catalog Number	Dia.	Turns Per Inch	Length	Approx. Inductance µh
3001	½"	4	2"	0.19
3002	½"	8	2"	0.75
3003	½"	16	2"	3.0
3004	½"	32	2"	12.0
3005	⅝"	4	2"	.28
3006	⅝"	8	2"	1.1
3007	⅝"	16	2"	4.5
3008	⅝"	32	2"	18.0
3009	¾"	4	3"	.37
3010	¾"	8	3"	1.5
3011	¾"	16	3"	6.0
3012	¾"	32	3"	24.0
3013	1"	4	3"	1.0
3014	1"	8	3"	4.0
3015	1"	16	3"	16.0
3016	1"	32	3"	64.0





LABORATORY EXPERIMENTS

In the laboratory, the Model 600 is a versatile and indispensable piece of test equipment. It can save the engineer many valuable hours during the course of experiments and general electronic work.

Here it is shown being used in an investigation of the self resonant frequency of solenoid coils.

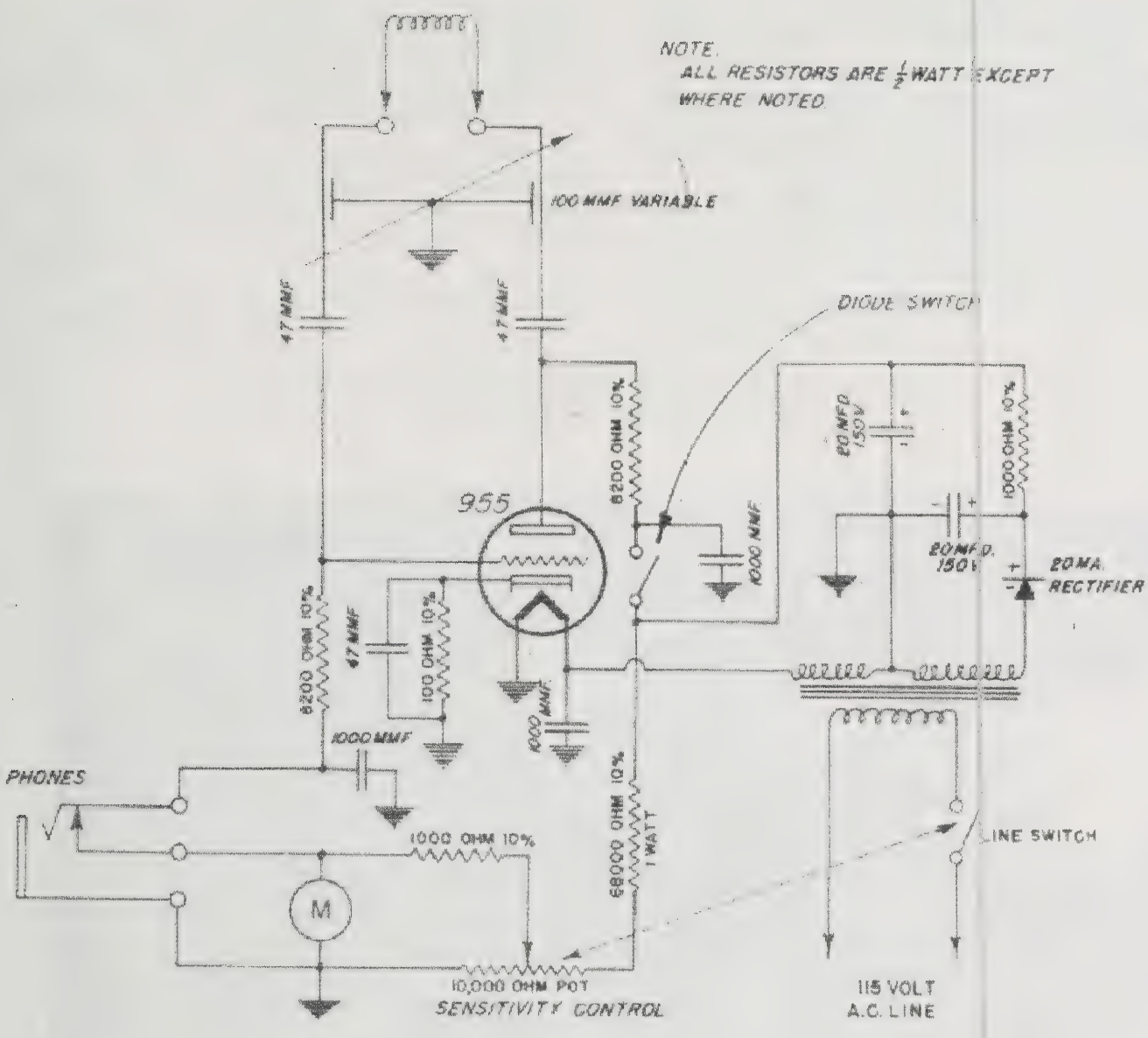

NOTE.
ALL RESISTORS ARE ½ WATT EXCEPT
WHERE NOTED.
100 MMF VARIABLE
47 MMF
47 MMF
DIODE SWITCH
6200 OHM 10%
955
1000 MMF
20 MFD 150V
1000 OHM 10%
20 MFD. 150V
20 MA. RECTIFIER
6200 OHM 10%
47 MMF
100 OHM 10%
1000 MMF
1000 MMF
PHONES
1000 OHM 10%
68000 OHM 10% 1 WATT
LINE SWITCH
M
10,000 OHM POT
SENSITIVITY CONTROL
115 VOLT
A.C. LINE

FIGURE 10

MAINTENANCE

When judiciously used and rough handling avoided, the instrument should give long and satisfactory service with a minimum of maintenance.

In time the instrument may show signs of reduced sensitivity and output, particularly on the higher frequencies. This is occasioned by tube aging and a new 955 oscillator tube should be employed.

To replace the tube, remove the two 6/32" round head screws on the back of the instrument near the bottom. The back will then lift off and the tube can be replaced.

Parts and values will be found in the schematic diagram, figure 10.

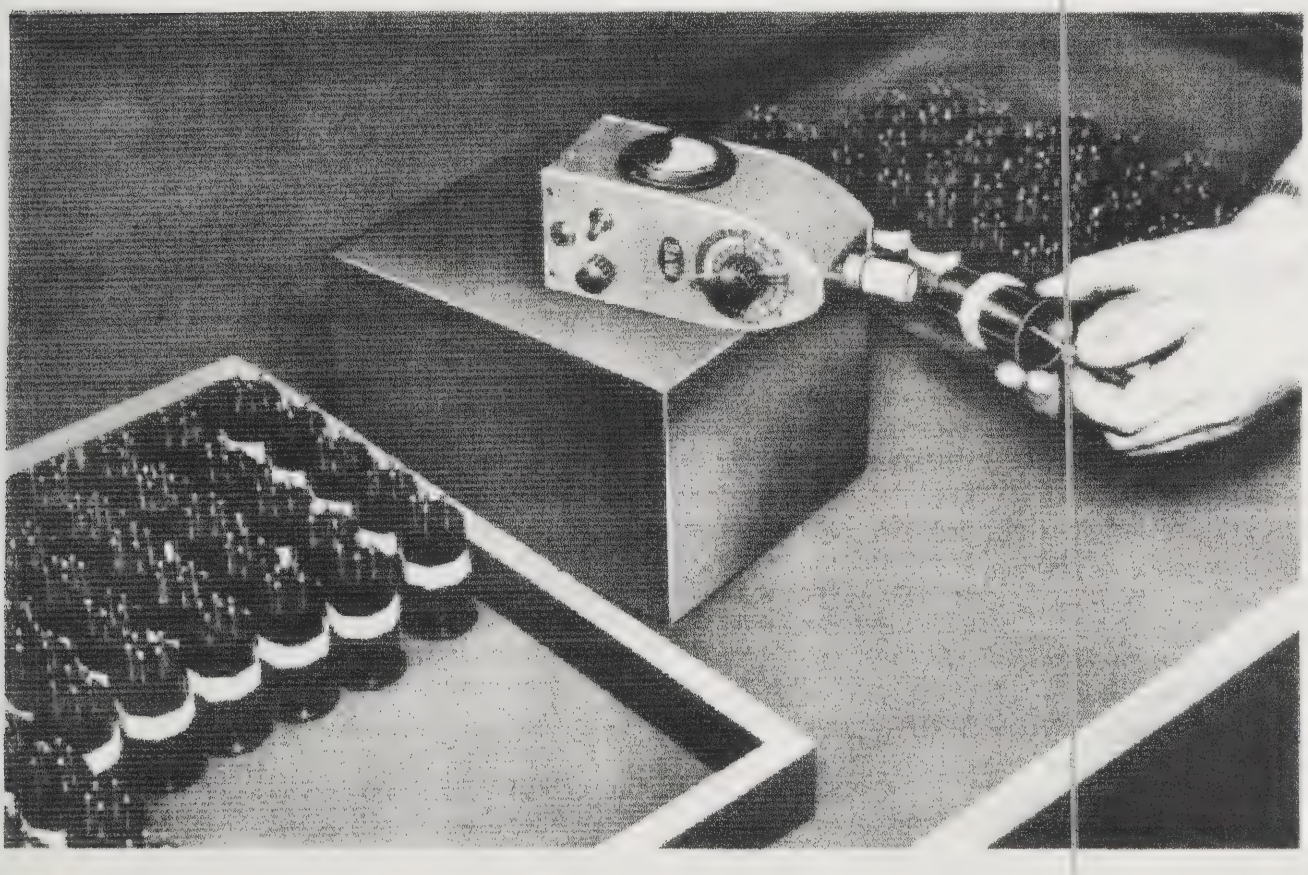
In case of severe damage to vital parts of the instrument it should be returned to the factory for repairs.

A serial number is stamped on the bottom of each instrument and a registration card attached to this instruction book.

Each registration card has provisions for the insertion of the name and address of the customer, the date of purchase, and the distributor from whom it was purchased.

These registration cards must be properly filled out and immediately returned to the factory. Failure to return your registration card automatically voids our guarantee given on the back cover of the instruction book.

Additional copies of the Instruction Manual are available for 25 cents each.



PRODUCTION LINE

Production line testing can be speeded up by using the B & W Model 600 Dip Meter.

The above photograph is a typical example in which the instrument is left in a fixed position. This is only one of the many ways in which the instrument can be useful in electronic component production.

SPECIAL USES

Many special uses for the B&W Model 600 Dip Meter will suggest themselves as familiarity with the instrument is gained. A few of these special applications are described below.

Mutual Inductance Between Two Coils

Connect the two coils in series and the combination across a standard capacitor. Measure the resonant frequency and determine the combined inductance as outlined in an earlier paragraph under "Applications—*L C Circuits.*" The connections to one of the coils is then reversed and the inductance of the combination again determined. The effective mutual inductance between the two coils is equal to one-fourth the difference between the two resultant measurements.

Coefficient of Coupling Between Two Coils

Measure the inductance of each coil leaving the other coil open. The coefficient of coupling is given by the following formula:

$$K = \frac{M}{\sqrt{L_1 \times L_2}}$$

where M is the mutual inductance and L_1, L_2 are the self inductances of the two coils respectively.

Measurement of Length of Cable

Open one end of the cable and short the other end with a small loop. Couple the instrument to the shorted end, and starting with the lowest frequency, note the frequencies of successive dips. The fundamental resonant frequency (based on a quarter wave) is approximately equal to one half the difference between two successive dips.

The physical length of the cable may now be calculated by the following formula:

$$L = \frac{246 \times k}{f\ (mc)} \text{ feet}$$

where L = length of cable (feet)
f = resonant frequency (megacycles)
k = relative propagation constant as given by cable manufacturer.

This scheme for finding cable length is of great utility when the cable is wound on a drum and it is not feasible to unwind it. Sometimes false dips are evident, due to proximity and sheath resonances, so that several determinations should be made until the results seem reasonable.

Use of Arbitrary Scale

One arbitrary scale (0-100) has been provided on the instrument for the purpose of calibrating coils that have been made by the user for covering special frequency ranges. Blank coil forms may be purchased for this purpose from B&W.

For a particular purpose the overlaps of the frequency ranges provided may be insufficient. A special coil can then be wound for bringing a particular frequency into the center of the range.

The frequency spread of the instrument may be greater than needed. It is possible, by means of special coil and condenser combinations, to bandspread a particular section of the range. This is done by the judicious variation of coil turns and shunting capacity until a desired result is attained.

BARKER & WILLIAMSON, INC.
237 FAIRFIELD AVENUE
UPPER DARBY,
PENNSYLVANIA

SM 7/52

Printed in U.S.A.

INSTRUCTION MANUAL

MODEL 5100 TRANSMITTER

BARKER & WILLIAMSON, Inc.

237 FAIRFIELD AVENUE

UPPER DARBY, PENNA.

PUTTING YOUR B&W TRANSMITTER ON THE AIR

1. After the equipment has been carefully removed from its packing box—be sure all tubes are in their respective sockets and pushed firmly into place.
2. The equipment as shipped from the factory comes to you ready to operate, with the exception of—crystals, microphone, key and antenna.
3. Before plugging the power line cord into a 115 volt A.C. 60 cycle single phase power source receptacle be sure that the A.C. line switch and the plate **on** and **off** switches are in the **off** position.
4. **Take time to be sure** you thoroughly understand the function of each control.
5. Before attempting to place the transmitter in operation and on the air, **be sure** you have a suitable antenna or dummy load connected to the output power connector.
6. For phone operation, a microphone should be connected to the microphone connector on the front panel.
7. For C.W. operation, a key with cord and suitable plug should be inserted in the key jack on the front panel.
8. For crystal operation on phone or C.W., a suitable 80 meter crystal is to be inserted in the crystal holder — located inside the cabinet on the crystal-buffer-amplifier unit and the crystal-VFO selector switch near the crystal holder is thrown in the crystal position.
9. For VFO operation on Phone or C.W., the **crystal is removed** and the Crystal-VFO selector switch is thrown in the VFO position.
10. Turn the A.C. line switch to the **on** position and make sure all tubes are lit. Allow tube filaments to run at least ten minutes when the equipment is first turned on.
11. Proceed as directed under operating instructions.

NOTICE

A FEW DONT'S TO REMEMBER

A. **Do not** turn the **Master Band Selector Switch** when the plate switch is in the **on** position.

B. **Do not** attempt to tune and operate the transmitter in VFO position unless you are sure that the Frequency **Control Dial Pointer** is correctly set on the appropriate frequency of each band corresponding to the **Master Band Selector Switch** — for crystal operation, make certain that a crystal of proper output freq. is chosen.

C. **Do not** attempt to make connections to the rear terminal strip on back of the chassis apron unless the A.C. line cord plug is removed from the power source.

D. **Do not** use the receiver disabling circuit nor the remote relay connections for conducting or breaking high current. Doing so will result in damage to the internal control relay contact points.

E. **Do not** make the error of reversing the push-to-talk connections when assembling the microphone plug, since the relay voltage present could damage the microphone. (See instructions elsewhere in this manual under microphone connector.)

F. **Do not** attempt to operate the equipment without a good ground attached to the ground terminal of the equipment.

WARNING

Death or serious injury may result if operators fail to observe safety precautions. Extreme **caution** is to be exercised during any observations or voltage measurements around live power circuits carrying *lethal voltages. Failure to observe all safety regulations may result in personal injury, if not loss of life.

*Underwriters regulations consider lethal any potential above 24 volts.

INTRODUCTION

The model 5100 transmitter has been designed for amateur communications service covering both radiotelephone and telegraph within the confines of the amateur frequency bands 80-40-20-15-11 and 10 meters. It is a compact, bandswitched, VFO or crystal controlled, self contained equipment containing all of the latest engineering advances leading toward the effective transmissions of signals with a minimum of harmonic content for prevention of television interference. Mainly intended for permanent station operation, the external source of power required for its operation is 115 volts, 50/60 A.C. It has been designed with a view toward striking appearance, high quality of workmanship, trouble free operation, ease of control and tuning and last, but not least for servicing, its unitized construction permits quick access and easy removal of any major section with minimum disturbance to other sections. The model 5100 transmitter may also be used to drive a higher powered R.F. final amplifier and class "B" audio modulator.

Its consistent operation coupled with an excellent quality of signal output, will meet all of the requirements of the most discriminating operator.

SUMMARY OF VARIOUS SECTIONS

Radio Frequency Section

The radio frequency section of the model 5100 consists of three separate units. First, the variable frequency oscillator (VFO) with the calibrated scale to read the frequency for each of the six amateur bands covered. Second, a buffer amplifier-crystal oscillator-keying tube unit which functions as a buffer amplifier when VFO operation is selected and as a crystal oscillator when operating in the crystal position. This unit also performs the function of block grid keying when either VFO or crytal operation is selected for CW operation. Third, the multiplier-final amplifier unit, the function of which is to multiply and amplify the selected output frequency.

Speech Amplifier-Modulator Unit

The speech amplifier modulator is a separate unit consisting of 4 tubes in a compact subassembly providing speech amplification from a crystal microphone and ample audio power to fully modulate the RF power output under maximum power conditions.

Power Supplies

Power supplies are of the conventional type utilizing heavy duty transformers and chokes and other components designed for typical amateur operation at maximum power. Two distinctly separate power supplies are used, the high voltage supply furnishing plate voltage for the R.F. final amplifier, modulators and multiplier stages, while a low voltage power supply provides the low potential D.C. and bias voltage as required. Provision has been made for front panel control of high voltage reduction during tune-up procedure.

TVI Suppression

Television interference suppression has been carried out to a degree found necessary by B&W's experience in this field. Precautions have been taken to prevent radiation from the more critical leads coming from the transmitter cabinet. Functional design within the R.F. section has been along lines which eliminate the source of much TVI. In addition to the details outlined above, the model 5100 contains as an integral part, a low pass filter which provides a minimum of 85 D.B. attenuation throughout the normal television channels with over 100 D.B. attenuation on channel #2.

Front Panel

The front panel contains the following controls — the A.C. line switch, tune operate switch, meter selector switch, microphone input jack, audio gain control, key jack, function switch, pilot light, plate power switch, master band selector, loading control, excitation control, plate tuning control, and main VFO frequency control dial clearly marked and printed to indicate all six bands. Also included is an all purpose meter which registers amplifier screen grid current, amplifier plate current and modulator plate current. Accessible through the rear of the cabinet are the A.C. cord, antenna connector and remote control line connection terminals. All rotating controls on the panel are equipped with richly styled machined aluminum knobs, with knurled edges.

Cabinet

The beautifully styled cabinet, finished in silver blue hammertone with gray panel, has rounded edges and corners and a hinged flush fitting lid providing access to the interior of the equipment for such functions as changing crystals and tube replacements, inspection etc. It is made of heavy gauge steel properly reinforced to adequately support the entire structure of the main chassis and associated subassemblies.

Dial Mechanism

The main frequency control dial which operates the VFO is a friction drive unit, extremely smooth in operation and permitting adjustment of frequency at the will of the operator.

SPECIFICATIONS

Frequency Coverage

80 meters	40 meters	20 meters
3.5—4.0mc	7.0—7.3mc	14.0—14.35mc
15 meters	**11 meters**	**10 meters**
21.0—21.45mc	26.96—27.23mc	28.0—29.7mc

Complete bandswitching on all bands.
VFO or crystal operation on AM or CW.
Power input — 135 watts phone — 150 watts CW.
PI-network output.
Built-in low pass filter.
TVI suppressed.
Stable VFO with accurately calibrated scale.
Output impedance — 75 ohms unbalanced.
External audio power output — 75 watts — Impedance 500 ohms.
Power source nominal — 110 volts single phase 50/60 cycles A.C.
Size — Width - 22" — Height - 11½" — Depth - 14¾".
Net weight — approximately 83 lbs.
Shipping weight — 90 lbs.

Tube Complement

VFO — 1 - Type 6BJ6

Crystal Oscillator Buffer Amplifier — 2 - Type 6BJ6

Multiplier — RF Amplifier — 4 - Type 6AQ5 - 2 Type 6146

Speech Amplifier — Modulator 1 - Type 6U8, 1 - Type 6AQ5, 2 - Type 6146

Low Voltage Power Supply — 1 - Type 5V4G

High Voltage Power Supply — 2 - Type 5R4GY

Voltage Regulators — 1 - Type VR150, 1 - Type VR105

DESCRIPTION AND FUNCTION OF VARIOUS SECTIONS

VARIABLE FREQUENCY OSCILLATOR

The variable frequency oscillator unit utilizes a type 6BJ6 tube in a Hartley type circuit, generating a fundamental frequency range between 1680 to 2005 KC.

The output frequency, through the medium of doubling is twice the value of the fundamental oscillator range, thus providing an output range equal to a low value of 3360 KC to a high of 4010 KC. This basic output range of frequencies, when multiplied covers all amateur frequencies within the limits of the amateur bands 80 - 40 - 20 - 15 - 11 and 10 meters.

The variable capacitor used in this unit has been designed to provide straight line frequency variation with respect to its rotation. The D.C. voltage for powering this unit is regulated by means of a VR-150 voltage regulator tube in the main low voltage power supply.

BUFFER-AMPLIFIER-CRYSTAL-OSCILLATOR-KEYING-TUBE-UNIT

This compact unit performs several functions. The first of two 6BJ6 type tubes used, performs as a buffer amplifier, while the second 6BJ6 is used as a crystal oscillator, second buffer and keyer tube. During VFO operation, the second 6BJ6 tube functions as an additional buffer stage, thus enhancing isolation between the VFO and the multiplier sections. In either case, VFO or crystal operation, the second 6BJ6 tube additionally functions as a keyer tube. This unit is driven by the variable frequency oscillator. The circuitry includes a band-pass filter for the purpose of attenuating fundamental oscillation frequencies, thus transferring only the desirable 80 meter signals required for the multiplier.

The VFO-crystal selector switch and crystal holder are located on the top of this unit in a convenient position for quick change-over from VFO to crystal or vice-versa. When crystal operation is desired, an 80 meter crystal providing fundamental or desired harmonic frequency, is inserted in the crystal holder and the VFO-crystal selector switch is thrown to the crystal position. When the VFO-crystal selector switch is in the crytal position, it functions to de-energize the first buffer and VFO while the second 6BJ6 tube then functions as a Pierce type oscillator.

The circuit has been designed to operate with 80 meter crystals, hence, the output frequency of the transmitter is either the basic crystal frequency or its multiples, depending on the setting of the band selector switch, which in part, functions to select the appropriate multiplier stages.

It is important to remove the crystal from its holder, during VFO operation on phone or CW.

FREQUENCY MULTIPLIER — FINAL AMPLIFIER

This unit which is driven by the output of the buffer amplifier-crystal oscillator-keyer tube unit, functions as a frequency multiplier and final amplifier.

The frequency multiplier section of this unit consists of 4 type 6AQ5 tubes in a broad-banded circuit eliminating the need of tuning each of the multiplier stages over the entire operating frequency range of the over-all equipment. This feature keeps tuning controls to a minimum. Selection of the multiplier stages is made through use of a switch which is ganged to the main band selector switch. Hence selection of the appropriate multiplier stages and final bandswitching is accomplished in one operation by the simple twist of one knob.

The power amplifier section of this unit employs two type 6146 beam power tubes in parallel providing the RF power output through a PI-network circuit.

Bandswitching is accomplished through the medium of a rotary type switch which as pointed out above is ganged to the multiplier section enabling simultaneous switching of the multiplier sections and the final amplifier. The PI-network in the output circuit enables loading and tuning adjustments to be made for compensating nominal variations in the antenna feed line system.

An excitation control in the grid circuit of the power amplifier stage is provided for effecting proper adjustment for the most efficient driving power as required for each individual band.

When the power amplifier is used in CW operation, the screen voltage is supplied by a constant source from the low voltage supply. However, when the power amplifier is modulated, the screen voltage is supplied from the high voltage supply by means of dropping resistors, so that plate and screen are modulated simultaneously. The circuitry of the multiplier and power amplifier has been designed to minimize spurious radiations.

All leads in the three units described above, constituting the complete RF section of this equipment, have been carefully filtered and shielded to minimize leakege and radiation. The mechanical construction of all three RF units as well as the speech amplifier-modulator unit have been designed with a view towards quick and easy removal of each individual unit, for purposes of inspection and service, with minimum disturbance to other functional units of the over-all equipment.

SPEECH AMPLIFIER — MODULATOR UNIT

SPEECH AMPLIFIER

The speech amplifier-section of this unit employs a type 6U8 triodepentode tube, the triode section of which is used as the preamplifier stage and the pentode section as a high gain second stage in order to obtain driving voltage for a type 6AQ5 tube functioning as a transformer coupled driver.

The volume control for governing the audio level is placed in the circuit between the triode and pentode sections of the dual purpose 6U8 speech amplifier tube. The audio power obtainable from the speech amplifier is more than ample to fully excite the 6AQ5 driver stage when a low level crystal microphone is used.

MODULATOR

The modulator portion of this unit is composed of two type 6146 beam power tubes, operating in class AB2.

The speech amplifier and modulator system provides approximately 75 watts of audio power, a greater amount than is required for 100% modulation of the R.F. amplifier operating at maximum power input. This audio power is also available for external use in driving a high powered modulator. The external output impedance through terminal strip connections on the rear chassis apron is 500 ohms. Precautions have been taken to completely shield this unit as well as filter its connecting leads in order that no difficulty due to RF feed-back is experienced.

POWER SUPPLIES

HIGH VOLTAGE SUPPLY

The high voltage power supply used for powering the RF amplifier, modulator and multiplier section delivers a nominal potential of 600 volts D.C. Two type 5R4GY tubes are employed in a full wave circuit together with a conventional type filter.

For purposes of improved filtering and better regulation, the filter reactor has been resonated at approximately 120 cycles by means of a shunt condenser. A bleeder is utilized across the output of the high voltage supply for discharging the residual charge in the filter capacitor section.

For tune up purposes, a resistor is employed in series with the primary of this supply, thus reducing the high voltage to a safe value. The control of these two levels of potential is through the panel mounted tune-operate switch.

LOW VOLTAGE SUPPLY

The low voltage power supply is a separate unit. It is used to furnish the plate power to the variable frequency oscillator, buffer-amplifier-crystal oscillator, speech amplifier, audio driver, modulator driver and the screens of the modulators.

In addition to the above, this power supply also delivers the required bias voltage for both the modulator and RF amplifier. In the CW operating position, this supply also provides the screen voltage for the RF power amplifier.

OPERATING INSTRUCTIONS

PHONE OPERATION

1. With either a suitable crystal inserted in the holder for crystal operation or the VFO adjusted to the desired frequency, the main band selector switch should be set to the proper band of operation.

2. Throw the A.C. line switch to the **on** position and allow tubes to warm up for at least two full minutes, meanwhile, throw the **tune operate switch** to the **tune position,** the meter switch to the **amp.** position and the **function switch** to phone position. The **load control knob** should be set at **zero.**

3. Throw the plate switch to the **on position** and adjust the plate tuning control to show a minimum meter reading. The **tune operate switch** should now be set to **operate.** The **loading control** should now be turned slowly toward ten and the plate tuning again adjusted for minimum. This procedure should be repeated until a reading of 200 is indicated by the meter.

4. Turn the meter switch to the **grid position** and **exc. control** until meter indicates approximately **17 mils.** Meter should now be switched to the **amp. position.** The **loading and plate tuning controls** should again be adjusted as outlined above, until a meter reading of 220 mils. is obtained. This indicates that the final is loading and power is flowing into either the dummy load or antenna, whichever is used.

5. When lower power output is desired, **the loading and plate tuning controls** should be adjusted accordingly as outlined in paragraphs 3 and 4 until the plate current as indicated by the meter registers proportionately with respect to the output power desired.

6. The transmitter is now ready to be modulated and the operator should proceed as follows:

   A) Advance the audio gain control knob.

   B) Turn meter selector switch to **mod. position.** This will indicate modulator resting plate current.

   C) While speaking into the microphone with normal voice, proceed to adjust the **audio gain control** to a point where the peak increase under modulation as indicated by the meter does not exceed 100 mils.

The modulator has sufficient audio power to more than fully modulate the maximum power input of the RF power amplifier, hence, the possibility of over-modulation should be avoided by keeping the audio gain control in a position which permits just enough audio power output to be generated for 100% modulation of the RF power amplifier.

The process as outlined above covers phone operation on crystal or VFO and applies to all bands.

OPERATING INSTRUCTIONS

C. W. OPERATION

1. Proceed to tune the transmitter as outlined in the preceding paragraphs, after which the function switch should be turned to the C.W. position.
2. In C.W. operation the microphone remains connected, but unused and a telegraph key is plugged into the key jack as follows —
   A) Insert the key plug into the **key jack.**
   B) **Retard audio gain control knob to minimum.**
   C) Turn the meter switch to the **amp. position.** When the plate switch is thrown to the **on** position, **the key** will further take control with respect to operation of the transmitter output.
3. In C.W. operation on any band, with key-up conditions, the oscillator is blocked and the power amplifier is biased to a safe value. Hence, under key-up conditions, the meter indication will be low, but normal under key down conditions.
4. Crystals for operation on the 40-20-15-11 and 10 meter amateur bands must always be of the 80 meter fundamental type. When the operator desires to operate on crystal at a specific frequency in any of these bands an 80 meter crystal which multiplies to the desired frequency of the chosen band **should be selected.**

DESCRIPTION AND FUNCTIONAL SUMMARY OF VARIOUS FRONT PANEL CONTROLS AND SWITCHES

Reading from left to right the bottom row of controls and switches functions as follows:—

1. **The A.C. line switch**
   This switch is used to break the primary circuit of the low voltage power supply. When this switch is in the **on** position the low voltage power supply is energized, thus, furnishing all filament and plate voltages for the VFO, crystal-oscillator-buffer-amplifier unit, speech amplifier, audio driver, modulator driver, screen voltage for the modulator tubes and bias voltage for modulator and RF amplifier tubes.
2. **Tune operate switch**
   This switch functions as a shunt for a resistor in the primary circuit of the high voltage power supply. When this switch is in the **tune position** it places the resistor in series with the primary winding, thus reducing the input voltage to a value sufficient for safe reduction of the high D.C. potential. When it is in the **operate** position, it shunts the resistor allowing the full primary voltage to be applied for use under normal operating conditions.
3. **Meter switch**
   This three position switch functions to place the indicating **meter** in three separate circuits. In the **grid position,** the meter is in series with the power amplifier screen circuit and thus indicates screen-grid current. In the **mod. position,** the meter is in series with the modulator plate voltage circuit, thus indicating modulator plate current. In the **amp. position,** the meter is in series with the RF amplifier plate voltage circuit, thus indicating plate current of the RF amplifier.

   Note

   When the meter switch is in the **grid position** the full scale reading of the meter **is 40 mils.** In the mod. and amp. positions the full scale reading of the meter is 400 mils.
4. **Audio gain control**
   This control is a potentiometer for use in controlling the audio level to the speech amplifier driver tube (6AQ5) and is placed in the circuit of the speech amplifier between the triode and pentode sections of the (6U8) dual purpose speech amplifier tube. **It should be in the minimum position when C.W. operation is in use.**
5. **Function switch**
   This switch is composed of two sections and is a six circuit, three position unit performing various functions as described below:—
   In the **C.W. position** it functions to short-circuit the secondary of the modulator transformer and switches the RF amplifier screen voltage to feed direct from the low voltage supply.
   In the **VFO position** it functions to disconnect the screen voltage from the RF amplifier, allowing plate voltage to remain on all other circuits. This position is used to **beat** the VFO signal selected, against the communications receiver for spot frequency operation purposes, etc.
   In the **phone position** it functions to remove the short-circuit across the secondary of the modulator transformer and switches the RF amplifier screen voltage to feed modulated voltage through dropping resistors from the high voltage supply.

   Note

   When it is desired to zero beat the transmitter operating frequency against a received signal, proceed as follows—
   A) With receiver BFO turned **on** tune to zero beat with desired incoming signal (on very strong incoming signals it may not be necessary to use receiver BFO).
   B) Set function switch on model 5100 transmitter to **VFO position** and adjust VFO to zero beat against the received signal on the communications receiver.
6. **Plate on and off switch**
   This switch functions to complete the circuit (when thrown to the **on** position) of the D.C. voltage which energizes the control relay. Two contacts of the control relay, when closed, completes the primary circuits of the high voltage supply, thus providing the required high voltage D.C. for normal operation.

Reading from left to right, the upper group of con-

trols function as follows:—

1. **Frequency control**
The large knob designated — frequency control — functions through a reduction unit whose ratio is approximately 30 to 1, to control the adjustment of the VFO variable capacitor. The velvet action of this control knob, simultaneously permits the operator to adjust the dial pointer on the frequency selector scale to the desired frequency of operation on any of the six bands.

2. **Loading control**
This control functions to adjust the high capacity variable loading condenser located across the output side of the PI-network circuit of the RF amplifier. Its adjustment determines the degree of loading throughout the tune-up procedures for each of the various bands. Graduations printed on the panel, permits a means of logging the readings for reset purposes.

3. **Exc. control**
This control functions to adjust a variable tuning condenser in the grid circuit of the RF amplifier. In tune-up procedure, it is adjusted to a point where the meter indicates not more than 17 mils. when the meter switch is in the **grid position.**

4. **Plate tuning**
The plate tuning control functions to adjust a variable tuning capacitor located at the input side of the PI-network circuit of the RF amplifier. This variable capacitor is adjusted to a point effecting resonance of the RF amplifier with respect to frequency and loading conditions as denoted by a minimum dip under loaded conditions as indicated by the meter when the meter switch is in the **amp. position.** The printed graduations on the panel, permits a means of logging the readings for reset purposes.

5. **Band selector**
This knob functions to simultaneously switch the multiplier stages and final amplifier PI-network to the desired frequency output. **This control should not be rotated when the plate switch is in the on position.**

Microphone connector

This connector unit is of the dual conductor type. One conductor is used for the high side of the microphone, while the remaining conductor is used as the push-to-talk connection. From the front view, the hole on the left side is the microphone connection, the one on the right, the push-to-talk connection.

The push-to-talk connection is a parallel conductor with the plate switch which functions to energize the control relay. Hence, when push-to-talk is used by the operator, the plate switch is left in the **off position.** A microphone with a suitable grip operated push type switch is required to place this control into operation.

Key Jack

The keying jack is of the closed circuit type, located in the grid circuit of the second buffer stage (6BJ6).

It functions to complete the circuit when not in use under phone operating conditions, while it breaks the grid circuit of the keying tube when the key plug is inserted. The on and off action in C.W. operation is then controlled by action of the key.

MAINTENANCE

B&W has exercised great care in the design and construction of this equipment in order to offer the users of its products, an equipment which will give long and satisfactory service with a minimum of care and adjustment.

Although the finest grades of materials and components have been used throughout and the equipment before shipping has been subjected to rigid factory inspection and final adiustment, a periodic check on the part of the operator is desirable in order to insure consistent and dependable service.

It is recommended that a general routine inspection be made periodically of all electrical and mechanical moving parts. Dust and other foreign particles which accumulate on and around rotary switch contacts, relays, dial mechanism and variable condenser plates, should be cleaned off with a dry brush free of oil deposits. Forced, clean dry air should be applied, wherever dirt or dust cannot be removed with a brush.

Tube failures are considered the major cause of interrupted service. Be sure and check the emission and performance of each tube at regular intervals to insure a high level and quality of signal output. Make sure all tubes are pushed firmly into place and that tube pins are free from corrosion and make good contact with the socket prongs. Take care in removing and replacing plate connectors to avoid breaking the tube seals and plate lead connection in the caps.

If possible keep an extra set of tubes on hand for spares. Such a set does not necessarily need to be a complete complement of tubes, but, one of each of the various types used in the equipment.

Removing Chassis from Cabinet

The model 5100 panel is secured to the cabinet by **six** round head screws through the front panel and **two** camlock fasteners on the chassis.

The **two** camlock fasteners are used to firmly secure the chassis to the bottom of the cabinet for shipping purposes. They are located, one on each side of the chassis directly below the front side of the two power transformers, they fasten through the outer lip of the chassis onto the cabinet reinforcement rails on which the chassis slides and rests. See drawing showing cutaway view.

To remove the chassis from the cabinet, first remove the six round head screws on the front panel. These are the screws which run through the wide trim stripe around the outer edge of the front panel. Next, the two camlock fasteners should be loosened with a screw-driver by a one-quarter turn in a counter clockwise direction. After the camlocks are loosened, both hands should be used to reach inside the cabinet gripping each of the two power transformers, one by each hand. Using an upward pull with both hands, to release the camlocks from their seat — the operator should simultaneously pull the chassis with a forward motion until the camlocks are out of their seats and the front panel overlap has been detached from the cabinet.

When placing the chassis back into the cabinet, the camlocks may be left out, if desired.

TROUBLE SHOOTING

Trouble shooting, parts replacement and repairs of a general nature, should be performed by a qualified technician or an operator with full knowledge of electrical circuits and ability to comprehend the function of each part as well as the ability to detect a defective component responsible for any erratic condition encountered, during the course of voltage and resistance tests and continuity measurements. In most cases of trouble, the difficulty can usually be isolated by means of tests and measurements and the section of the transmitter at fault, when determined, can be quickly and easily removed for repairs without in any way disturbing the other sections of the equipment. Proceed as follows:

1. In cases of interrupted service, first make a check for filament voltage when the A.C. switch is thrown to the **on** position. If tubes do not light, check the fuse and if blown, replace with one of similar value (5 amps.). Do not replace fuse with one of higher value. If fuse blows out when switch is thrown again, check primary circuit of low voltage power supply for a possible short circuit to ground. If primary checks out showing no short to ground, the secondary should be checked for a possible shorted filter capacitor or a defective rectifier tube and other components in the filter circuit.

2. Assuming that filament and low voltage D.C. potentials are normal when the A.C. switch is thrown to the **on** position, but the fuse blows out when the tune-operate switch is thrown to the operate position, the checks and procedures outlined under paragraph (1) above also apply in these instances.

3. If difficulty persists after checks given under paragraphs 1 and 2, proceed with a voltage check for each pin connection of the chassis connectors to ground and compare meter readings with those given under chassis voltage Table #1. With all power switches in the **off** position — proceed as follows:—

   A) Disconnect all male cable connectors from the chassis leading to the modulator, buffer-amplifier, VFO and multiplier-RF amplifier.

   B) With all rectifier and regulator tubes in their respective sockets, throw the A.C. line switch to the **on** position and allow rectifiers to warm up. Next throw the tune-operate switch to the operate position and last, throw the plate switch to the **on** position.

   C) The voltage reading as measured with a 20,000 ohms per volt volt-ohmmeter, between chassis and each female connector pin **on the chassis** should compare within a tolerance of plus or minus 10% of the voltage given for each respective pin of the various female chassis connectors listed under Table #1.

TABLE #1
CHASSIS CONNECTORS - VOLTAGE TABLE
FUNCTION SWITCH IN PHONE POSITION

FEMALE CONNECTORS	PINS											
PIN NO'S.	1	2	3	4	5	6	7	8	9	10	11	12
J-3	0	6.3AC	0									
J-4	+165	6.3AC	0	0								
J-5	0	0	0	-60	0	+880	0	0	0	0	6.3AC	6.3AC
J-6	6.3AC	0	-60	6.3AC	0	+300	+900	+900	0	+900	0	0

4. For continuity and resistance measurements utilizing a 20,000 ohm per volt volt-ohmmeter, proceed as follows:—

   A) With all power switches in the **off** position and A.C. line cord removed from the power source, remove all tubes and **male connector plugs** from the chassis leading to VFO, buffer-amplifier, modulator and multiplier-RF amplifier.

   B) Resistance measurements between chassis and each female connector pin and tube socket pin connection on the chassis should compare within a tolerance of plus or minus 10% of the values given for each respective value of the various female chassis connectors and socket pin connections under Table #2.

TABLE #2
FEMALE CHASSIS CONNECTORS & TUBE SOCKETS
RESISTANCE MEASUREMENTS
FUNCTION SWITCH IN PHONE POSITION

FEMALE CHASSIS CONNECTORS	PINS											
PIN NO'S.	1	2	3	4	5	6	7	8	9	10	11	12
J-3	0	0	∞									
J-4	∞	0	∞	32K								
J-5	∞	∞	∞	3700	—	60K	0	0	0	10K	0	0
J-6	0	∞	3800	0	0	—	60K	60K	∞	∞	0	0
TUBE SOCKETS												
V-14	∞	0	—	∞	∞	—	∞	∞				
V-15	∞	4800	—	∞	0	∞	4800	∞				
V-16	∞	70K	∞	40 ∿	∞	37 ∿	∞	60K				
V-17	∞	70K	∞	40 ∿	∞	37 ∿	∞	60K				
V-18	—	—	∞	—	0	—	—	—				

5. For continuity and resistance measurements of the individual units — VFO, buffer-amplifier, modulator speech amplifier and multiplier RF amplifier, proceed as follows, utilizing a 20,000 ohm per volt volt-ohm-meter—

   A) With all power switches in the **off** position and the A.C. line cord removed from the power source, disconnect the male plug connector, (of any of the units to be tested) from the female counterpart of that respective connector on the chassis and proceed with resistance measurements from each **male** connector plug pin to ground.

   B) Resistance measurements between chassis and each plug pin should compare within a tolerance of plus or minus 10% of the values for each of the connector pins listed under Table #3.

TABLE #3
RESISTANCE MEASUREMENTS WITH TUBES OUT
UNIT MALE PLUG CONNECTORS

MALE PLUG CONNECTORS	PINS											
PIN NO'S.	1	2	3	4	5	6	7	8	9	10	11	12
BUFF-AMP.-P4	∞	FIL.	∞	∞								
MODULATOR-P6 SPEECH AMP.	FIL.	∞	∞	FIL.	∞	—	∞	∞	∞	∞	0	0
MULTIPLIER-P5 R.F. AMP.	∞	∞	∞	∞	∞	∞	0	0	0	∞	FIL.	FIL.
VFO - P3	0	FIL	∞									

Erratic Conditions

6. Most erratic operating conditions such as, insufficient driving power to R.F. amplifier, modulators, and low D.C. potentials including plate, screen, bias voltages and currents are normally the result of low tube output, hence, it is recommended that all or such tubes as may be suspected of causing trouble resulting in interrupted or erratic operation of a particular section, be replaced or at least tested for compliance to standard performance, before any attempt is made to seek other sources causing improper operation of any particular section.

7. When tubes have been eliminated as the possible source of any particular difficulty encountered, the schematic diagram of the equipment, provided in this manual, should be used for reference in identifying a particular defective component during the course of voltage and resistance measurements covered under paragraphs 1, 2, 3, 4, and 5 under trouble shooting above.

TERMINAL CONNECTIONS

CHASSIS APRON (Rear View)

Figure—

The information given below applies to the terminal connections located on the rear chassis apron of the model 5100 transmitter. Reading from left to right, the terminal connections are as follows:

1. R.F. power output connector
2. A.C. line connections
3. Directly below the A.C. line connections is the fuse holder
4. Terminal strip connections #11 through #1.

FUNCTIONAL SUMMARY OF REAR CHASSIS APRON

TERMINAL CONNECTIONS

The RF power output connector is an SO-239 coaxial fitting. This is the output of the built-in low pass filter. Its counterpart, PL.259 should be used with an appropriate length of 75 ohm coaxial line for power take-off.

The A.C. line connections are the external end of two high-pass type capacitors. The fuse holder is of the screw-in type housing a 5 amp. fuse cartridge, type 3AG.

The terminal strip connection #11 through #1 are as follows:

Terminals #11 and #10 are two of the internal control relay contacts. These contacts which are normally open, may be used in connection with an external antenna change-over relay circuit. When the plate switch is turned on they complete the antenna change-over energizing circuit and vice-versa.

Terminals #9 and #8 are two additional control relay contacts. These contacts which are normally closed, may be used for a communications receiver disabling circuit, choice of which is left to the operator. The internal control relay contacts #8, #9, #10 and #11 covered above have been provided for those who wish to fully utilize the control features built into the model 5100 transmitter.

In addition to the normal multiband performance herein described the model 5100 transmitter can also be utilized to provide the following:

1. Unmodulated R.F. power output for driving a higher powered final amplifier.
2. 75 watts of audio power for driving a higher powered modulator, less the R.F. driving power. Impedance value of audio output is 500 ohms.
3. Unmodualted R.F. power output in combination with 75 watts of audio power output through 500 ohms for the dual purpose of driving a higher powered final amplifier and modulator unit.

To obtain unmodulated R.F. power output for driving purposes indicated under (1) above, turn the **function switch** on the front panel to **C.W. position.** Connect a suitable coax line from R.F. output power connector to input stage of high powered final. Proceed as directed under operating instructions.

To obtain 75 watts of audio power output less the R.F. driving power indicated under (2) above, turn **function switch** on front panel to **phone position.** Open jumper connections between terminals 7 & 6, 4 & 3 on rear terminal strip. Connect a suitable 500 ohm line between terminals 7 & 5 to input of high powered modulator.

To obtain the combination of unmodulated R.F. and audio driving power as indicated under (3) above, turn **function switch** on front panel to **C.W. position.** Open jumper connections 7 & 6, 4 & 3 on rear terminal strip. Connect a suitable coax line from R.F. output power connector to input stage of high powered R.F. amplifier. Connect a suitable 500 ohm line between terminals 7 and 5 to input of high powered modualtor unit.

Terminals #2 and #1 are the extension of the push to talk circuit provided on the front panel through the microphone connector. These terminal connectors may be used for remote operation purposes as individually required by each operator. Terminal #1 also serves as the common chassis ground. It is highly recommended to tie #1 terminal down to a good ground through heavy copper wire or braid.

ALIGNMENT AND TUNING PROCEDURE

MULTIPLIER R. F. AMPLIFIER UNIT

1. Remove multiplier R.F. amplifier unit from main chassis by disconnecting power cable plug (#P 5), remove four mounting screws, all knobs and coax output cable.
2. Provide a suitable extension power cable with appropriate plug and jack connectors to match P#5, and J#5 permitting operation of unit external to chassis also a suitable extension coax line to match P#2 and J#2.
3. Set function switch on VFO position — **This is important.**
4. Place the test leads of a 20,000 ohm per volt, volt-ohmmeter across the R.F. amplifier grid resistor R 23, value 22K, located on back panel of RF amplifier unit. Set instrument scale to 250 volt D.C. and observe proper polarity.
5. Adjust excitation control — variable capacitor C 36 until its rotor plates are enmeshed approximately 60%. The unit is now prepared for alignment for each individual band and the next steps for each band are as follows—
6. **80 meter band**
   (A) Set band selector switch on 80 meter position.
   (B) Set VFO frequency to 3750 K.C.
   (C) Adjust core screw of L-6 to obtain maximum reading on meter which has been placed across R 23.
7. **40 meter band**
   (A) Set band selector switch on 40 meter position.
   (B) Set VFO frequency to 7200 K.C.
   (C) Adjust core screw of L-7 to obtain maximum reading on meter.

8. **20 meter band**
   (A) Set band selector switch on a 20 meter position.
   (B) Set VFO frequency to 14, 200 K.C.
   (C) Adjust core screw of L-8 to obtain maximum reading on meter.

9. **15 meter band**
   (A) Set band selector switch on 15 meter position.
   (B) Set VFO frequency to 21,150 K.C.
   (C) Adjust core screw of L-9 to obtain maximum reading on meter.

10. **10 meter band**
   (A) Set band selector switch on 10 meter position.
   (B) Set VFO frequency to 28,800 K.C.
   (C) Adjust core screw of L-10 to obtain maximum reading on meter.
   (D) Adjust capacitor trimmer C-31 which is across the grid of V-7 for maximum reading on meter. The C-31 capacitor trimmer is located on the underside of the multiplier RF unit.

11. **11 meter band**
   (A) Set band selector switch on 11 meter position.
   (B) Set VFO frequency to 27,120 K.C.
   (C) Adjust capacitor trimmer C-38 accessable through hole on left side of multiplier RF amplifier panel, for maximum reading on meter.
   (D) Adjust capacitor trimmer C-33 accessable through hole on right side of multiplier RF amplifier panel, for maximum reading on meter.
   (E) Repeat adjustments of C-38 and C-33 as required to obtain maximum reading on meter.

The multiplier RF amplifier unit is now completely aligned and it can be placed back in its position on the main chassis, etc.

ALIGNMENT AND TUNING PROCEDURE

VFO UNIT

The VFO unit as shipped from the factory is completely aligned. Realignment is a matter which only becomes necessary in those cases where the oscillator tube needs to be changed or the dial cord requires replacement.

In such cases where the oscillator tube has been changed, the procedure for alignment of this unit is as follows:

1. A signal source of exactly 3.6 mc. is to be tuned in on a communications receiver.
2. After the VFO unit has been allowed to warm up, turn frequency control knob and set pointer on scale to read the exact frequency used as pointed out under paragraph #1 above.
3. The last step required is to adjust the small trimmer capacitor (C3) located on the top of the VFO chassis until the VFO frequency as varied by the adjustment of (C3) zero beats exactly with the standard as monitored on the communications receiver.

This completes the alignment procedure required in cases of tube replacements.

When the VFO unit requires realignment due to a broken dial cord, the procedure is as follows:

1. After the dial has been restrung with a new cord, tune in a signal of known frequency on the communications receiver. The known frequency in this case can also be same as used above, 3.6 mcs.
2. The next step is to turn the frequency control knob until the VFO produces a zero beat against the signal tuned in on the communications receiver.
3. The last step is to move the dial pointer assembly without in any way altering the zero beat signal on the communications receiver, until the pointer reads 3.6 mcs. on the scale.

Detailed instructions covering the dial cord replacement is given in a drawing elsewhere in this manual.

ANTENNA SYSTEMS

The Model 5100 may be used with a variety of antenna systems, however, since it is factory equipped with a low pass filter whose characteristic output impedance is 75 ohms, the output power should be arranged to feed into a load of equal impedance. This does not mean that the operator is limited to use an antenna feed line system with an impedance of 75 ohms only, on the contrary, several line impedance values can be utilized effectively, the choice of which is left entirely to the operator and local conditions affecting the installations, etc.

Several typical examples of antennas and feed line systems which can be successfully used with the 5100 transmitter are illustrated under figures (1A) (2A) (3A) (4A) (5A) (6A).

SUMMARY OF VARIOUS ANTENNA SYSTEMS

Fig. (1A) SINGLE BAND HALF WAVE FOLDED DIPOLE ANTENNA

This diagram illustrates the Model 5100 transmitter connected to a half wave folded dipole antenna. The impedance match from 75 to 300 ohms and the transformation from unbalance to balance is effected through the medium of the B&W multiband balun unit assembly made up with two B&W type #3975 bifilar wound coils.

Several of these antennas may be used for such applications where local conditions provide space and the operator chooses to use a separate antenna for each band of operation.

Where space and local facilities do not provide for high gain type antennas for 20-15 and 10 meters, these fundamental types will be found to give satisfactory results.

Fig. (2A) MULTIBAND ANTENNA FOR 80-40-20 and 10 METERS

A multi-band antenna of this type provides the operator with a radiating system for each of the bands listed above. Perhaps not as effective as separate half wave antennas due to orientation restrictions, it can be considered a compromise where space limitations and other local conditions would normally confine operations to one or two bands only.

Considering that no switching or tuning is required, this compromise antenna system provides a means of quick changeover from one band to another for those who wish to fully utilize multiband operation with the Model 5100 transmitter.

Fig. (3A) **BEAM ANTENNAS**

This illustration shows the method of effectively connecting and matching the output of the Model 5100 to a beam antenna, through use of a B&W beam matching balun. 75 ohm coaxial line is used from the output of the Model 5100 to the beam matching balun which mounts at the beam. Instructions provided with the beam baluns covers installation instruction details.

Applicable baluns for the 20-15 and 10 meter bands are as follows:

20 Meter — B&W #702
15 Meter — B&W #701
10 Meter — B&W #700

Fig. (4A) **HALF WAVE SPLIT DIPOLE ANTENNA**

This illustration shows a half split dipole antenna. Its performance in every respect is similar to the folded dipole, illustrated in Fig. 1A. However, the feed line system is of the 75 ohm twin parallel wire type. The #3975 type balun in this case is wired accordingly as covered by the instruction sheets packed with these balun units. Like the folded dipole, several of these antennas can be arranged for quick switching when operation on another band is desired.

Fig. (5A & 6A) **HALF WAVE SPLIT DIPOLE AND END FED ZEPP USING OPEN WIRE FEED LINE SYSTEM**

These antennas from the operational viewpoint are basically similar to the other half wave types shown under Figs. 1A and 4A. Transformation from unbalance to balance is accomplished through the medium of the antenna coupler circuit.

The antenna coupler essentially consists of a B&W antenna coupler coil with a fixed link and a B&W JCX100E variable split stator condenser equipped with a jack bar and mounting brackets, providing a compact assembly without leads.

Feed line impedance matching is obtained by tapping of the open wire feed line at appropriate points across the antenna coupler coil, while the proper load for the transmitter is achieved by a combination of adjusting the transmitter loading and plate tuning controls and the adjustment of the antenna tuning condenser.

While this system is extremely flexible from the standpoint of its ability to match and function well with a varied collection of open wire feed line systems, the only objectional factor disliked by a few operators is the extra tuning control. However, in spite of such objections, it can be considered as the only simple and practical solution to the problem of matching an assortment of different antennas with various types of feed line systems of different impedance values.

Although this antenna coupler and matching system has been shown here as used with half wave antennas, its usefulness can also be extended in other applications with longer antennas, such as the odd or even half wave multiple types as well as the rhombic and "V" type high gain antennas, in fact, any antenna system where a resonant or non-resonant feed line system can be adapted.

A suggested method of adjusting the antenna coupler when used with the PI-network output of the B&W Model 5100 transmitter is given below:

1. With the **tune operate switch** in the **tune position,** adjust the loading control of the Model 5100 until the plates of the loading capacitor are fully meshed. The scale reading as indicated by the pointer on the knob will be "0".

2. Refer to Figs. 5A & 6A and short circuit C1 then adjust plate tuning control on Model 5100 transmitter for minimum dip as indicated by the meter, when **meter switch** is in **amp. position.**

3. Remove short circuit and adjust C1 for maximum loading.

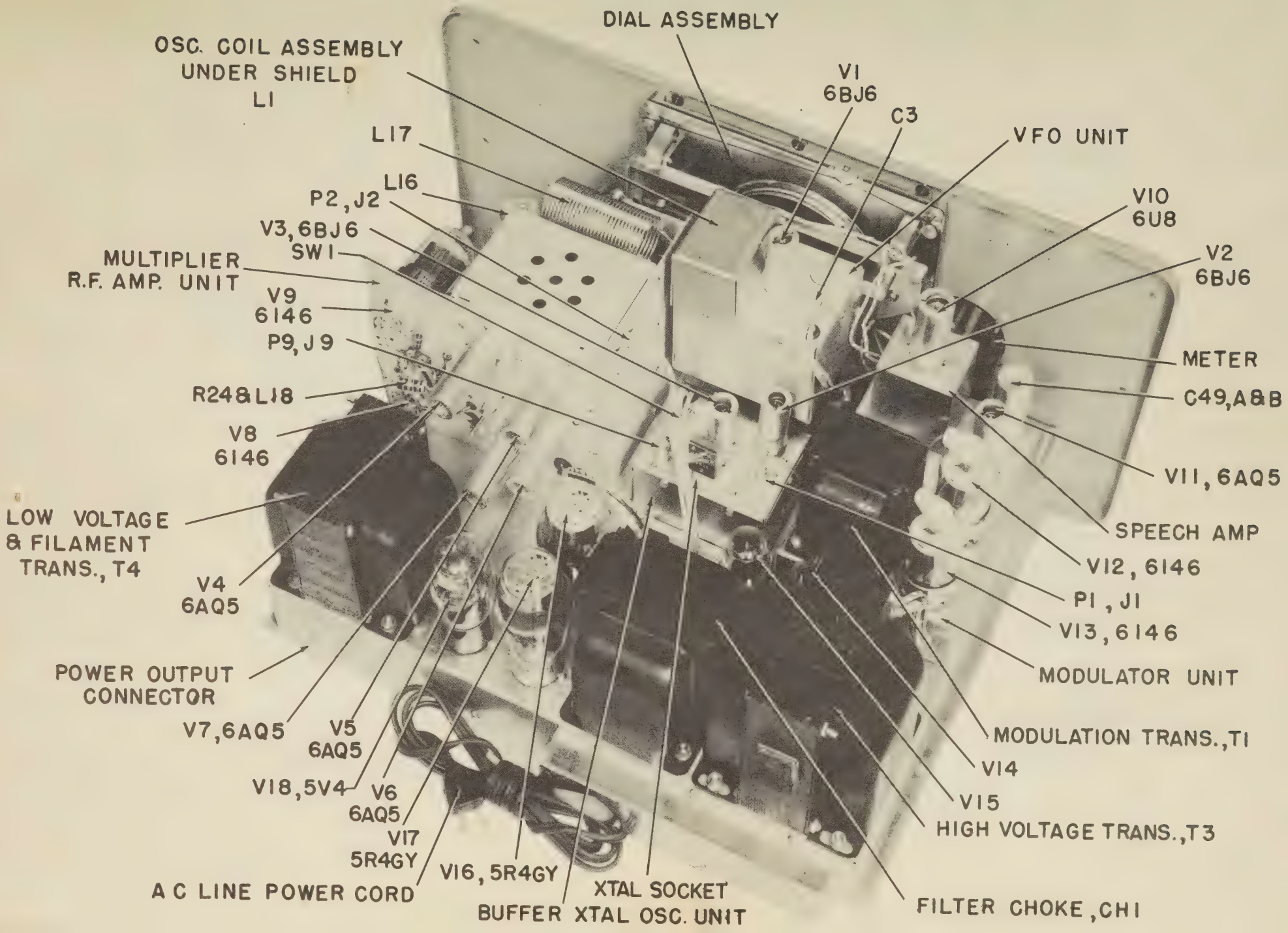
4. Tap feeders on L1, starting at extreme outer ends of coil. Locate correct tap points on coupler coil, by moving taps towards center, that gives maximum loading, corresponding with reading of C1 under paragraph #3 above.

5. Throw **tune operate switch** to the **operate position** and proceed with adjustment of loading control on Model 5100 until the final is loaded to maximum and repeat the minimum dip of the plate tuning capacitor as explained under paragraph "2" above. At this point, if the setting of C1 is same as noted under paragraph #3 above, the standing wave ratio can be considered to be satisfactory while on the other hand if the setting of C1 indicates an increase in capacity for proper load conditions, the line is inductively reactive or capacitively reactive when the setting of C1 at this condition, shows a decrease in capacity.

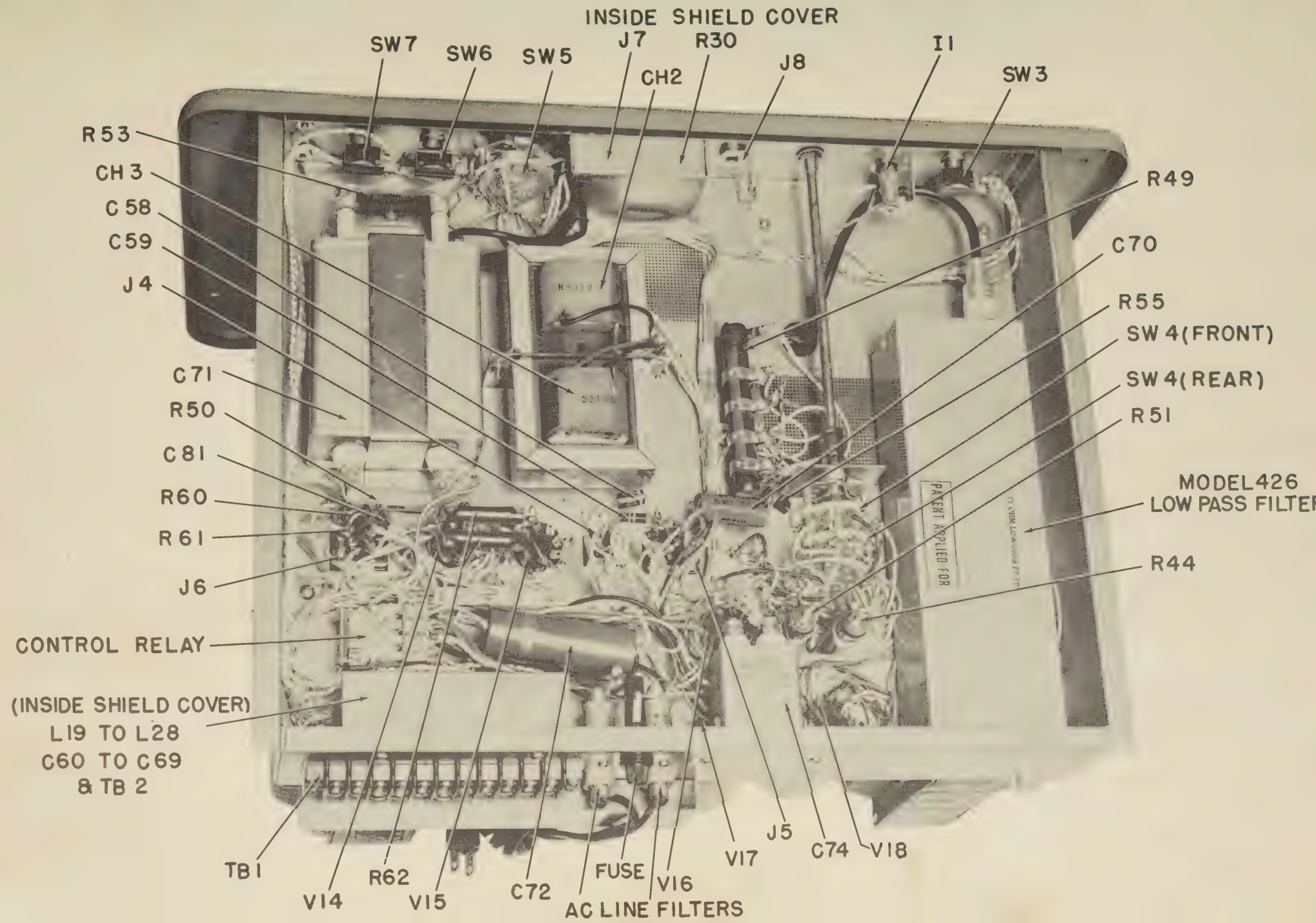
6. The correction of either inductive or capacitive reactance in cases where the operator desires to obtain a minimum SWR, is best accomplished through use of an SWR indicator placed in the coax line between the transmitter output and the antenna coupler. Repeating the matching and tuning process explained above, until a minimum SWR is obtained.

For other type antennas not covered herein, reference to the ARRL antenna handbook provides a good source of information.

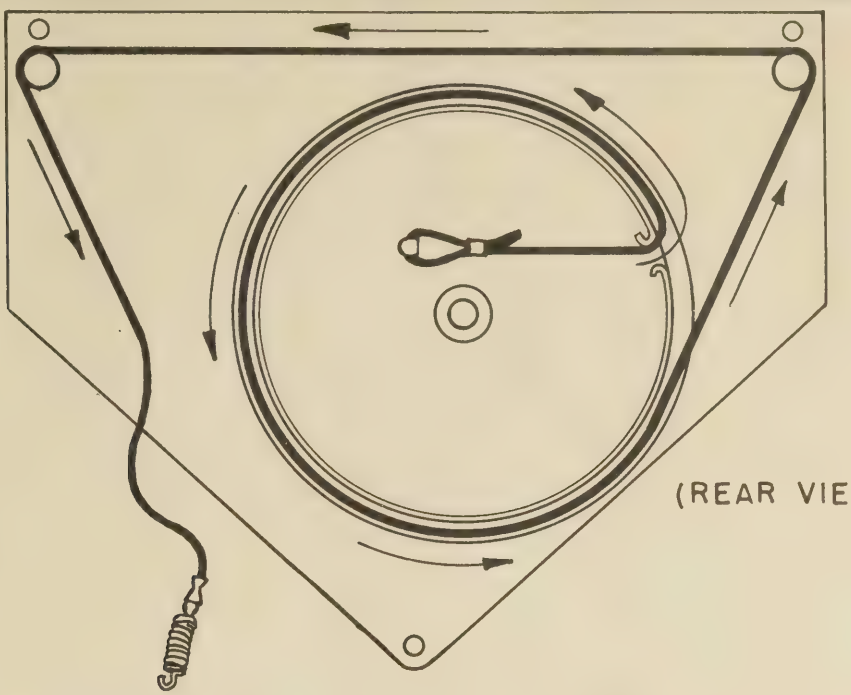
CHASSIS - TOP VIEW



CHASSIS-UNDERSIDE VIEW



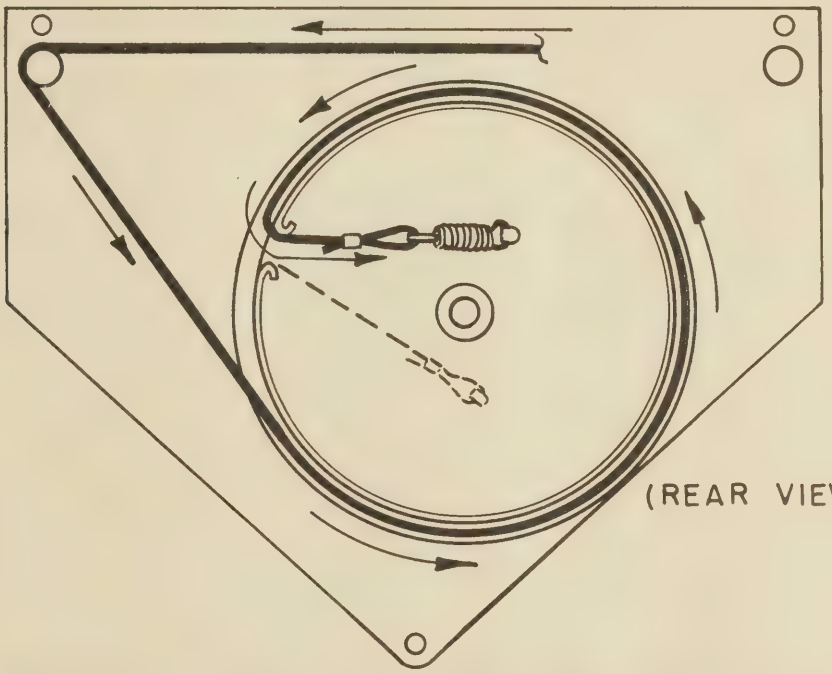
INSTRUCTIONS FOR STRINGING VFO DIAL ASSEMBLY



(REAR VIEW)

STEP 1

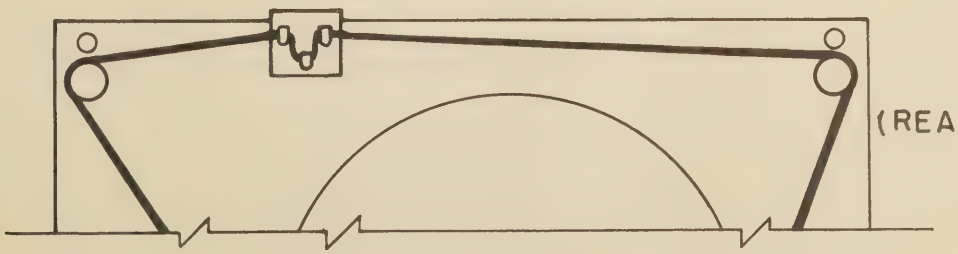
ROTATE LARGE PULLEY TO POSITION SLOT AS SHOWN. USE A HOOK-ENDED TOOL TO CATCH LOOP OF CORD IN PROJECTION ON TOP OF PULLEY.



(REAR VIEW)

STEP 2

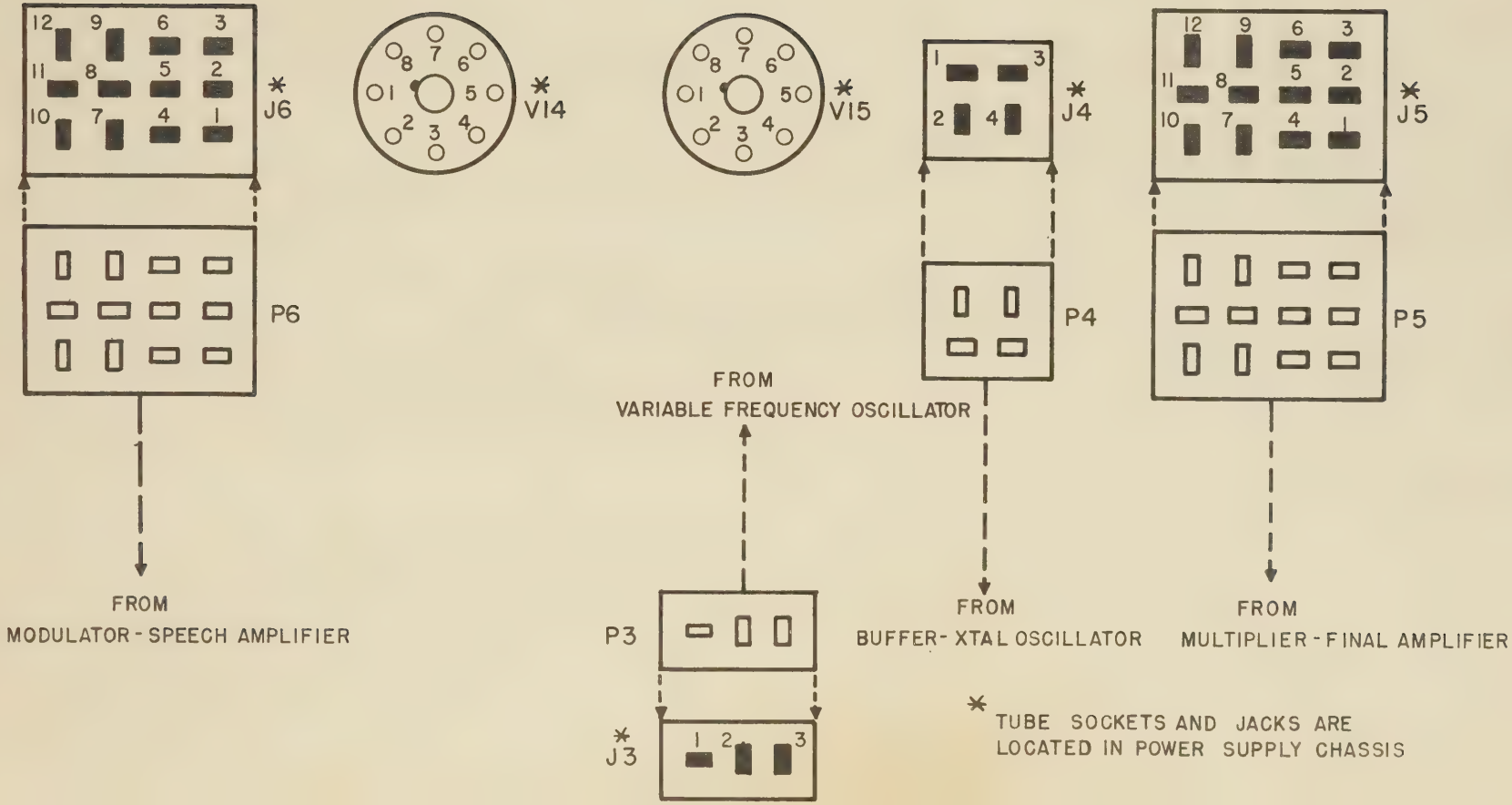
ROTATE LARGE PULLEY TO POSITION SHOWN. USE HOOK-ENDED TOOL TO SECURE SPRING LOOP IN TOP PROJECTION.



(REAR VIEW)

STEP 3

ROTATE LARGE PULLEY TO THE MID-POINT OF ITS ROTATION AND INSTALL POINTER AS SHOWN.


* V17
5R4-GY
* V18
5V4
* V16
5R4-GY
* J6
P6
* V14
* V15
* J4
P4
* J5
P5
FROM
VARIABLE FREQUENCY OSCILLATOR
FROM
MODULATOR - SPEECH AMPLIFIER
P3
* J3
FROM
BUFFER - XTAL OSCILLATOR
FROM
MULTIPLIER - FINAL AMPLIFIER
* TUBE SOCKETS AND JACKS ARE
LOCATED IN POWER SUPPLY CHASSIS

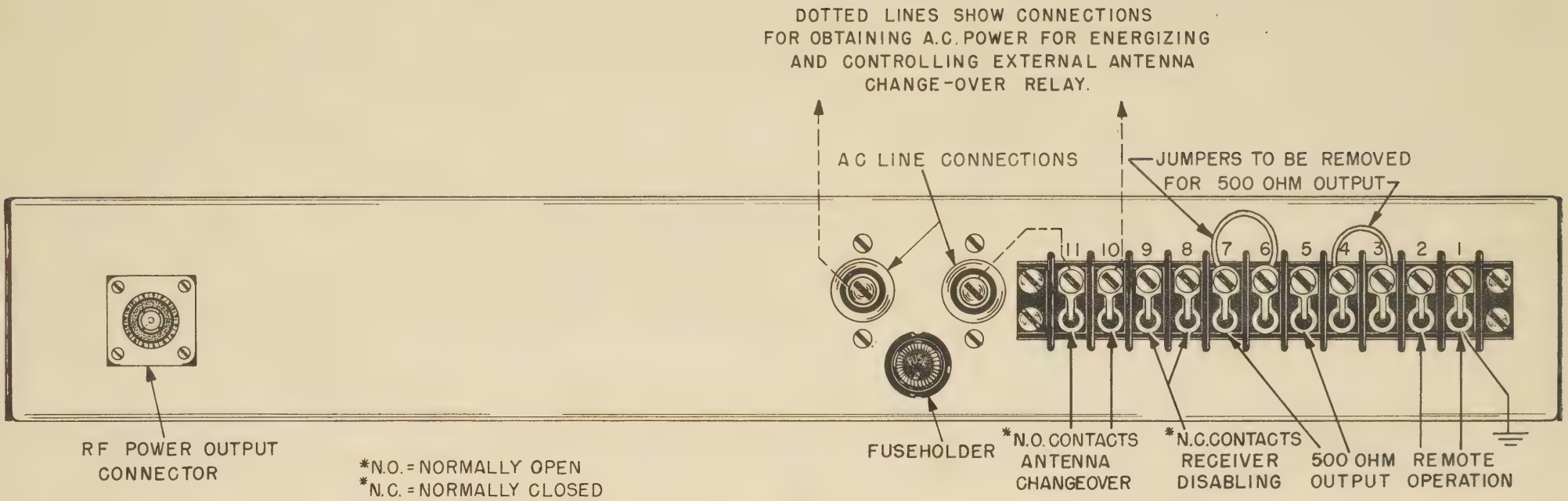


FIGURE - CHASSIS APRON (REAR VIEW)

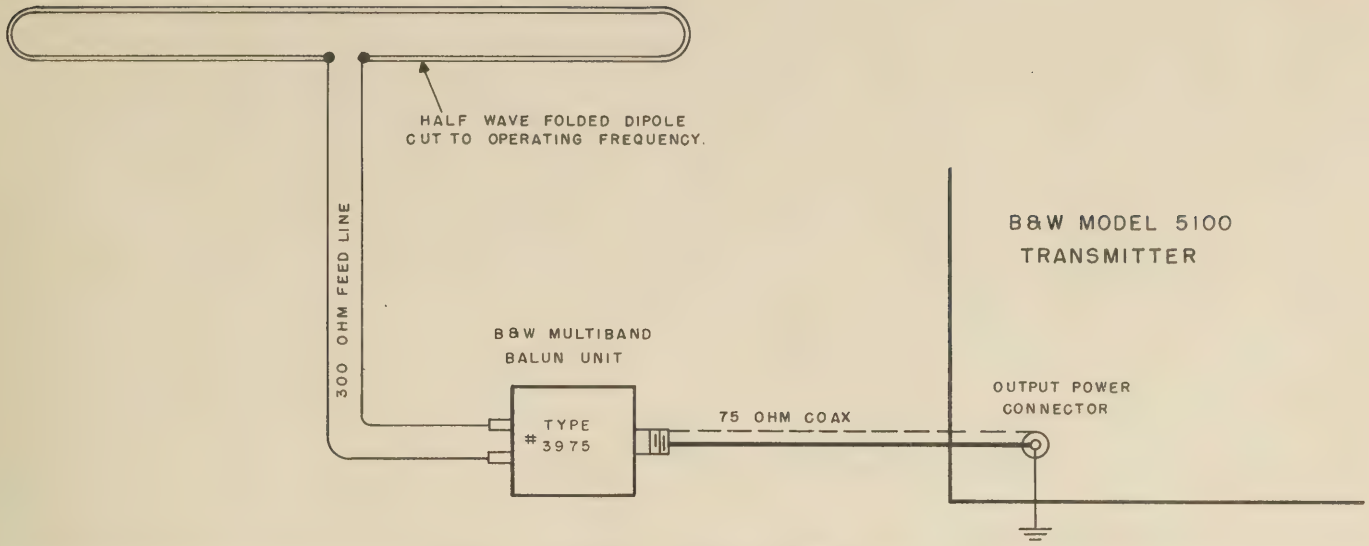


FIGURE 1A- SINGLE BAND ANTENNA

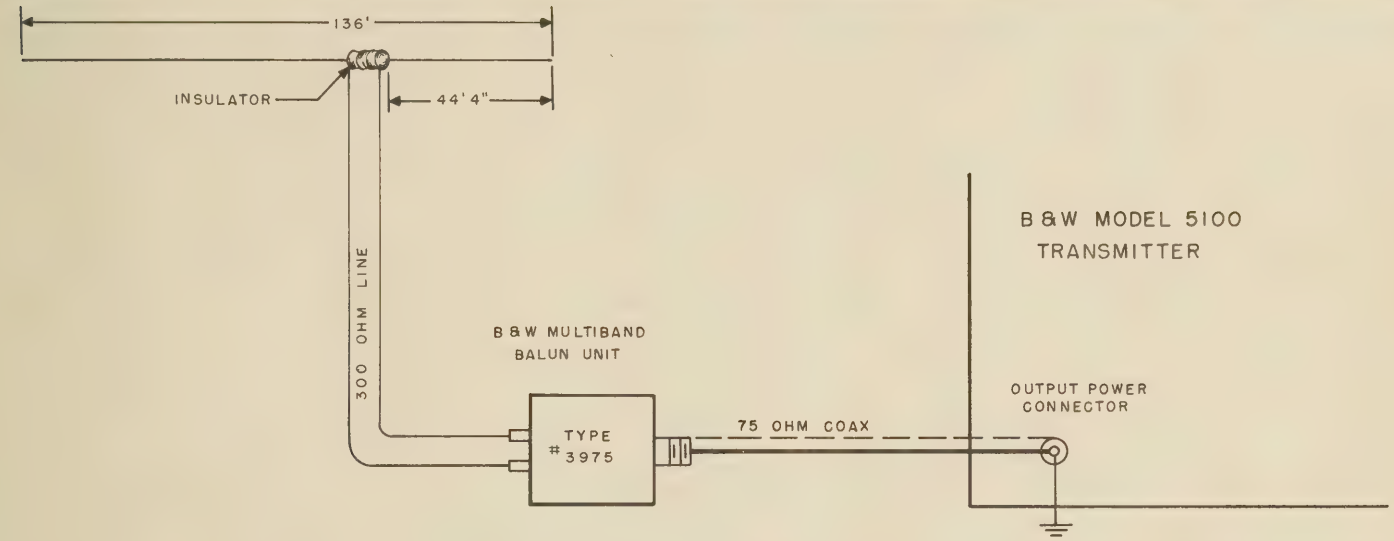


FIGURE 2A - MULTIBAND ANTENNA COVERS, 80, 40, 20 AND 10 METERS.

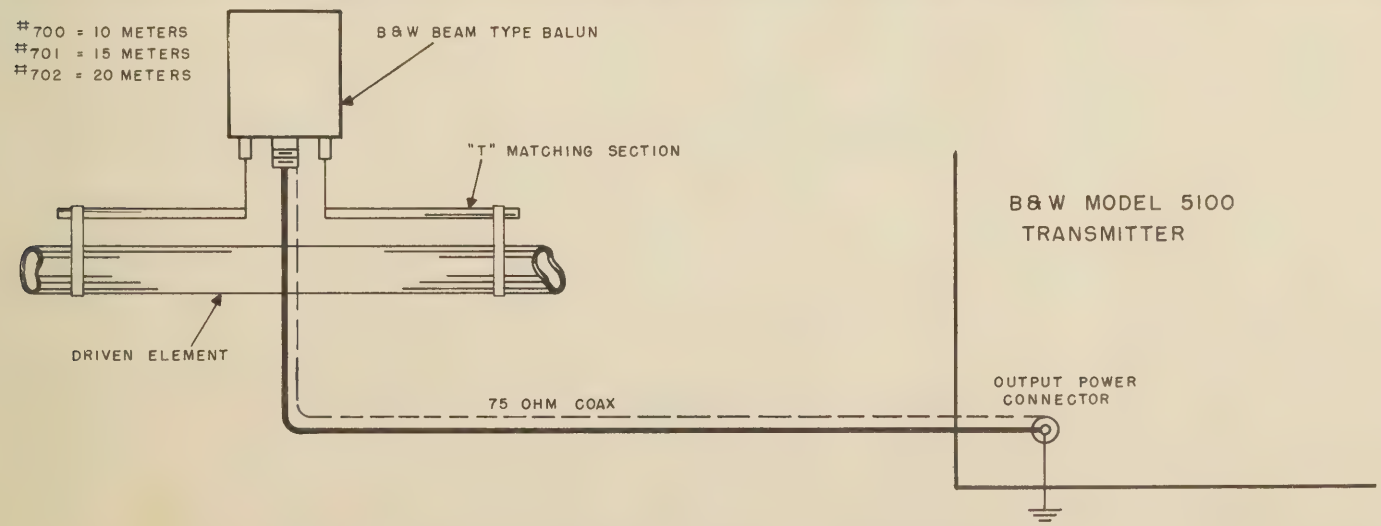


FIGURE 3A- BEAM ANTENNAS FOR EITHER 10, 15 OR 20 METERS.

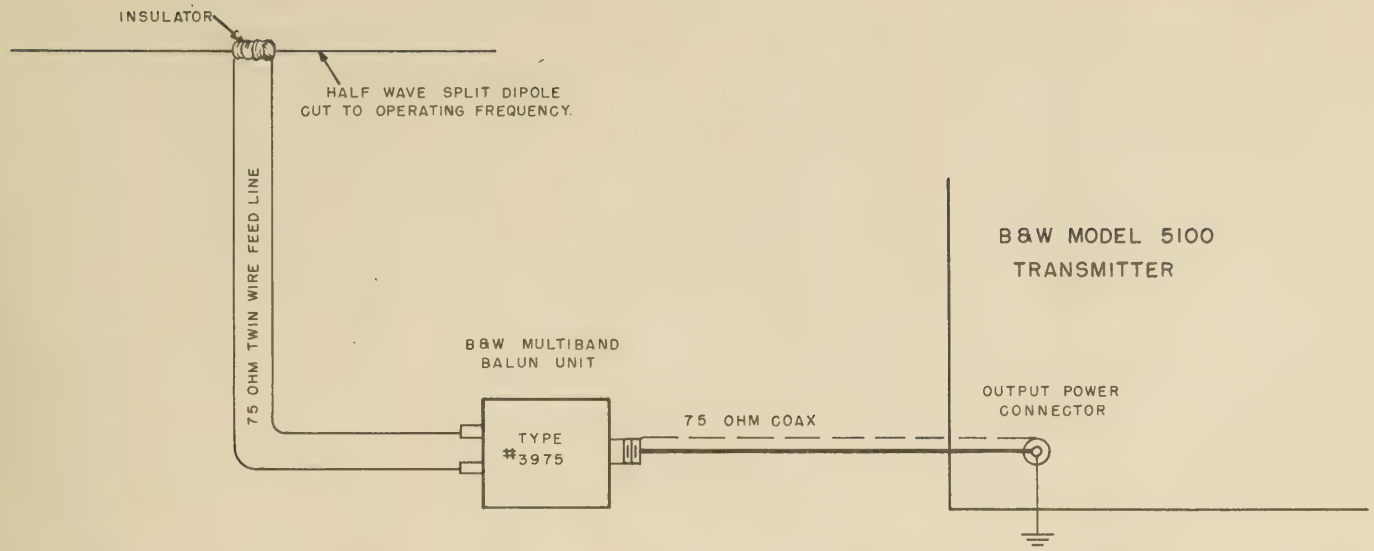


FIGURE 4A- SINGLE BAND ANTENNA

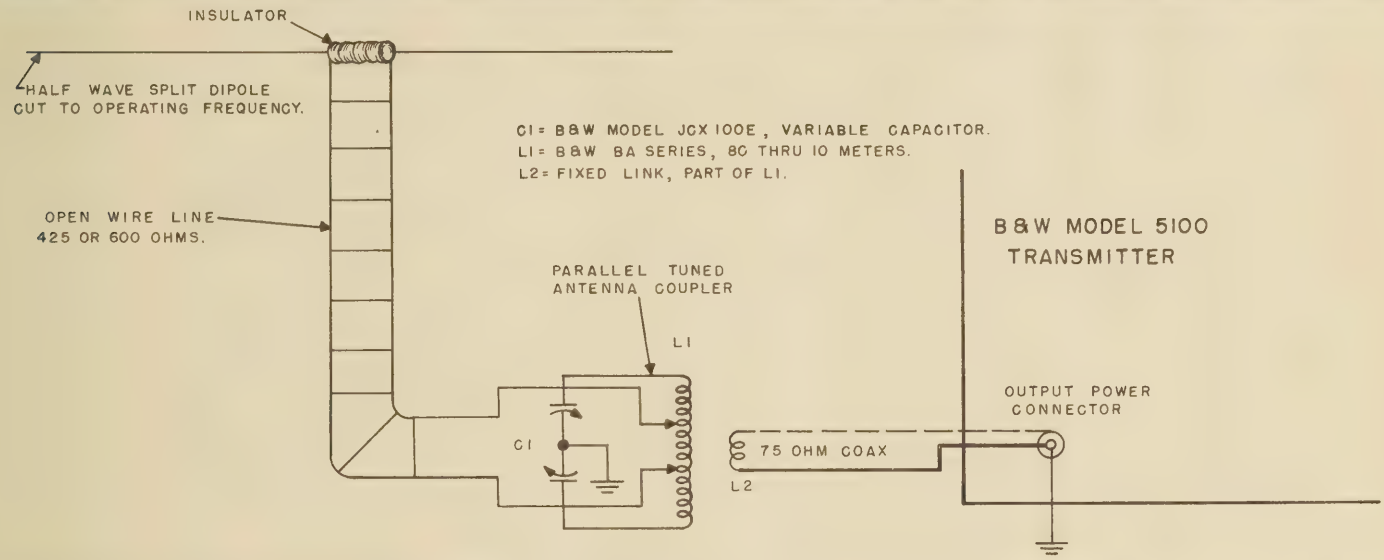


FIGURE 5A- CENTER FED, HALF WAVE SPLIT DIPOLE.

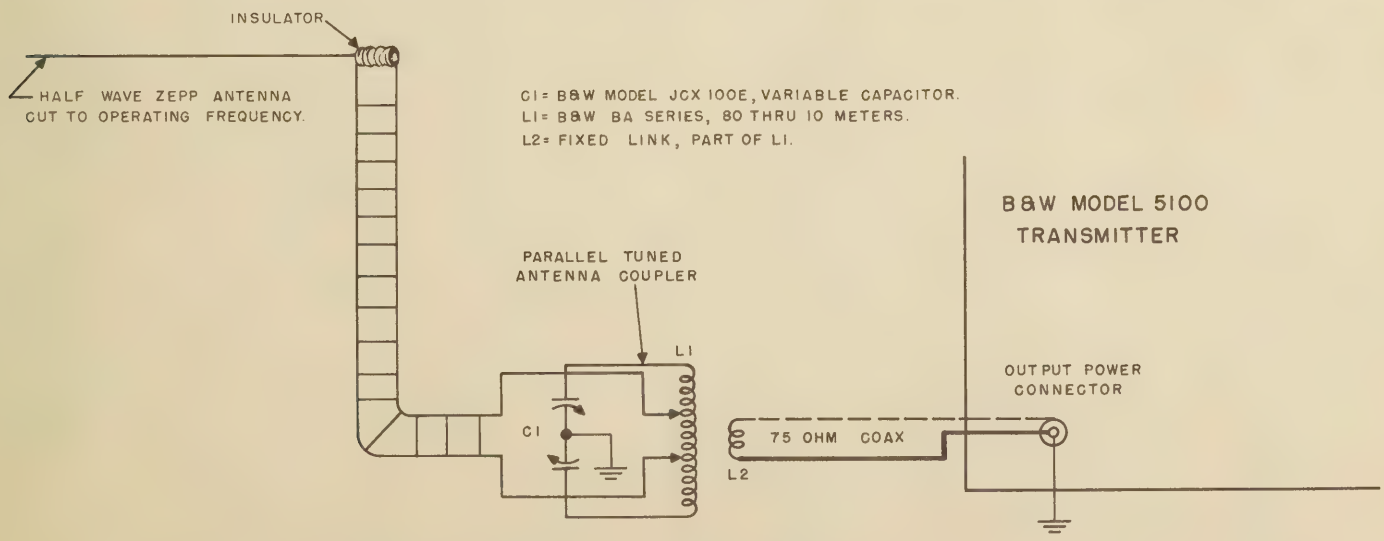


FIGURE 6A- END FED, HALF WAVE ZEPP.

PARTS LIST - MODEL 5100 TRANSMITTER

Circuit Symbol	Sub. Assy. Location	Description	B & W Part #
C15	Buffer Xtal Osc.	Capacitor Ceramic Tubular 50 MMF ±5MMF —750 Neg. Temp. Coeff.	T-616
C16	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509
C17	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509
C18	Buffer Xtal Osc.	Capacitor Ceramic Tubular 95 MMF ±9.5 MMF —750 Neg. Temp. Coeff.	T-643
C19	Buffer Xtal Osc.	Capacitor Ceramic Tubular 20 MMF ±2 MMF —750 Neg. Temp. Coeff.	T-644
C20	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509
C75	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509
C76	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509
C21	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C22	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C23	Multiplier F. A.	Capacitor Fixed Ceramic CC21UJ430J	T-621
C24	Multiplier F. A.	Capacitor Mica 100 MMF 1500 VDCW ±20%	T-501
C25	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C26	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C27	Multiplier F. A.	Capacitor Mica 100 MMF 1500 VDCW±20%	T-501
C28	Multiplier F. A.	Capacitor Fixed Ceramic CC26UJ750J	T-622
C29	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C30	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C31	Multiplier F. A.	Trimmer Erie TS-2A-N-500-7-45	S-123
C32	Multiplier F. A.	Capacitor Mica 100 MMF 1500 VDCW ±20%	T-501
C33	Multiplier F. A.	Trimmer Erie TS-2A-N-500-7-45	S-123
C34	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C35	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C36	Multiplier F. A.	Capacitor Variable Air 28 MMF APC type	T-SP-160
C37	Multiplier F. A.	Capacitor Mica 100 MMF 1500 VDCW ±20%	T-501
C38	Multiplier F. A.	Trimmer Erie TS-2A-N-500-7-45	S-123
C39	Multiplier F. A.	Capacitor Fixed Mica VCM20B 102M Elmenco 1000 V.	T-SP-164
C40	Multiplier F. A.	Capacitor Fixed Mica .002 MMF 2500 VDC - CM50A202J	T-SP-162
C41	Multiplier F. A.	Capacitor Variable Air 325 MMF	T-SP-163
C42(A&B)	Multiplier F. A.	Capacitor Variable Dual 530 MMF	T-656
C44	Multiplier F. A.	Capacitor Fixed Mica .0051 MF 2500 VDC CM50A512 J	T-SP-161
C45	Multiplier F. A.	Capacitor Fixed Mica VCM20B 102 M 1000 Volt	T-SP-164
C46	Modulator S. A.	Capacitor Disc .001 MF	T-509
C47	Modulator S. A.	Capacitor Mica 50 MMFD	T-614
C48	Modulator S. A.	Capacitor Disc .001 MF	T-509
C49A C49B	Modulator S. A.	Capacitor Electrolytic 10-10 MFD 500V.	T-577
C50	Modulator S. A.	Tubular Paper Capacitor .1 MFD 400V.	T-617
C51	Modulator S. A.	Capacitor Disc .001 MF	T-509
C53	Modulator S. A.	Capacitor Electrolytic Single 10MF/25V	T-615
C54	Modulator S. A.	Capacitor Disc .001 MF	T-509
C55	Modulator S. A.	Capacitor Disc .001 MF	T-509
C56	Modulator S. A.	Capacitor Disc .001 MF	T-509
C57	Modulator S. A.	Capacitor Disc .001 MF	T-509
C58	Power Supply C.	Capacitor Tubular Paper .1 MFD 200V.	T-673
C59	Power Supply C.	Capacitor Disc Ceramic .01 MFD 500 V.	T-607
C60	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C61	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C62	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C63	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C64	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C65	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C66	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C67	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C68	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C69	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C70	Power Supply C.	Capacitor Electrolytic 20 MFD 150 V.	T-578
C71	Power Supply C.	Cap. oil filled paper 10 MFD 1000 V. with mtg. strap for inv. mtg.	T-579
C72	Power Supply C.	Dual Elect. Capacitor Aluminum case 20-20 MFD 450V. with mtg. strap	T-581
C74	Power Supply C.	Capacitor oil filled paper .25 MFD 2000 volts with mtg. strap for upright mtg.	T-580
C81	Power Supply C.	Capacitor Disc .001 MF	T-509
SW1	Buffer Xtal Osc.	Toggle Switch—S.P.S.T.	T-537
SW2	Multiplier F. A.	Switch 6 position 5 wafer ceramic	T-556
SW8	Multiplier F. A.	Switch 6 position 1 wafer with detent & shaft 3/8" bushing 1-5/8" shaft lgth.	T-555
SW3	Power Supply C.	Bat Handle toggle switches 3A. 125V. S.P.S.T.	T-592
SW4	Power Supply C.	Selector Switch non-shorting 3 pole 2 section	T-594
SW5	Power Supply C.	Selector Switch non-shorting 3 pole 1 section	T-595
SW6	Power Supply C.	Bat Handle toggle switches 3A. 125 V. S.P.S.T.	T-592
SW7	Power Supply C.	Bat Handle toggle switches 3A. 125 V. S.P.S.T.	T-592
P1	VFO	Phono Plug	T-288-1
P3	VFO	Cable Plug (3)	T-667
P2	Buffer Xtal Osc.	Phone Plug (Jumper between Buffer & Multiplier)	T-288-1
P9	Buffer Xtal Osc.	Phone Plug (Jumper between Buffer & Multiplier)	T-288-1
P4	Buffer Xtal Osc.	Cable Plug (4)	T-666
P5	Multiplier F. A.	12 pin Jones Plug	T-633
P6	Modulator S.A.	12 pin Jones Plug	T-633
J1	Buffer Xtal Osc.	Phono Socket	T-288
J9	Buffer Xtal. Osc.	Phono Socket	T-288
J2	Multiplier F.A.	Input Jack	T-288
J3	Power Supply C.	3 terminal Jones Socket	T-674
J4	Power Supply C.	4 terminal Jones Socket	T-591
J5	Power Supply C.	12 terminal Jones Connector	T-590
J6	Power Supply C.	12 terminal Jones Connector	T-590
J8	Power Supply C.	Jack, Key	T-593
J7	Modulator S. A.	2 contact locknut receptacle Amphenol 80-PC2F	T-611
L1	VFO	Oscillator Coil Assy.	T-715
L2	VFO	Filament Choke - RFC	T-359
L3	VFO	Plate Choke	T-712
L4	Buffer Xtal Osc.	Grid Choke	T-712
L5	Buffer Xtal Osc.	Screen Choke	T-713
L6	Multiplier F.A.	80 M 37 MH Coil Assy.	5100-2
L7	Multiplier F.A.	40 M 9.5 MH Coil Assy.	5100-3
L8	Multiplier F.A.	20 M 2.5 MH Coil Assy.	5100-4
L9	Multiplier F.A.	15 M 2 MH Coil Assy.	5100-1
L10	Multiplier F.A.	10 M .68 MH Coil Assy.	5100-5
L11	Multiplier F.A.	R. F. Choke Screen	T-711

PARTS LIST - MODEL 5100 TRANSMITTER

Circuit Symbol	Sub. Assy. Location	Description	B & W Part #
R1	VFO	Resistor 100,000 ohms 1/2W. 5%	R-22
R2	VFO	Resistor 560 ohms 1/2W. 10%	T-244
R3	VFO	Resistor 10,000 ohms 1/2W. 5%	R-16
R4	Buffer Xtal Osc.	Resistor Composition 150 ohm 1/2W. 10%	R-62
R5	Buffer Xtal Osc.	Resistor Composition 5600 ohm 1/2W. 10%	R-63
R6	Buffer Xtal Osc.	Resistor Composition 220 ohm 1/2W. 20%	R-64
R7	Buffer Xtal Osc.	Resistor 100,000 ohms 1/2W. 5%	R-22
R8	Buffer Xtal Osc.	Resistor Composition 150 ohms 1/2W. 10%	R-62
R9	Buffer Xtal Osc.	Resistor Composition 1000 ohms 1/2W. 10%	R-65
R10	Buffer Xtal Osc.	Resistor Composition 5600 ohms 1/2W. 10%	R-63
R54	Buffer Xtal Osc.	Resistor Composition 220 ohm 1/2W. 20%	R-64
R11	Multiplier F. A.	Resistor Carbon 47,000 ohm 1 W. 10%	R-56
R12	Multiplier F.A.	Resistor Carbon 560 ohm 2 W. 10%	R-57
R13	Multiplier F.A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R14	Multiplier F.A.	Resistor Carbon 2200 ohm 2W. 10%	R-81
R15	Multiplier F.A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R16	Multiplier F.A.	Resistor Carbon 47,000 ohm 1W. 10%	R-56
R17	Multiplier F.A.	Resistor Carbon 1,000 ohm 2W. 10%	R-80
R18	Multiplier F.A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R19	Multiplier F.A.	Resistor Carbon 47,000 ohm 1W. 10%	R-56
R20	Multiplier F.A.	Resistor Carbon 1,000 ohm 2W. 10%	R-80
R21	Multiplier F.A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R22	Multiplier F.A.	Resistor 18,000 ohm 2W. 10%	R-82
R23	Multiplier F.A.	Resistor Carbon 22,000 ohm 1W. 10%	R-59
R24	Multiplier F.A.	Resistor Carbon 47 ohm 2W.10%	R-60
R25	Multiplier F.A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R26	Multiplier F.A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R56	Multiplier F.A.	Resistor Wire Wound 1500 ohm 5W. 10% Ohmite	R-79
R57	Multiplier F.A.	Resistor Carbon 47 ohm 2W. 10%	R-60
R58	Multiplier F.A.	Resistor Carbon 47 ohm 2W. 10%	R-60
R27	Modulator S. A.	Resistor 10 Meg. 1/2 W. ±10% insulated	R-38
R28	Modulator S. A.	Resistor Composition 5600 ohm 1/2W. 10%	R-63
R29	Modulator S. A.	Resistor Carbon 270,000 ohm 1/2W. 10%	R-49
R30	Modulator S. A.	Potentiometer Composition .5 Meg.	T-612
R31	Modulator S. A.	Resistor Composition 560 ohm 1/2W. 10%	T-244
R32	Modulator S. A.	Resistor Fixed Composition 1 Meg Ohm 1/2 W. 5%	R-7
R33	Modulator S. A.	Resistor Composition 330,000 ohm 1/2 W. 5%	R-32
R34	Modulator S. A.	Resistor Composition 5600 ohm 1/2W. 10%	R-63
R35	Modulator S. A.	Resistor Composition 470,000 ohm 1W. ±10%	R-69
R36	Modulator S. A.	Resistor Composition 470,000 ohm 1/2W. 10%	R-66
R37	Modulator S. A.	Resistor Composition 300 ohm 1W. ±5%	T-626
R38	Modulator S. A.	Resistor Composition 1000 ohm 1/2W. 10%	R-65
R39	Modulator S. A.	Resistor Composition 1000 ohm 1/2W. 10%	R-65
R40	Modulator S. A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R41	Modulator S. A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R42	Modulator S. A.	Resistor 5000 ohm 10 watt 20% wire wound	T-113
R43	Modulator S. A.	Resistor wire wound 4.7 ohm 1W. ±5%	R-70
R60	Modulator S. A.	Resistor Composition 100,000 ohm 2W. 10%	R-71
R61	Modulator S. A.	Resistor Composition 100,000 ohm 2W. 10%	R-71
R63	Modulator S. A.	Resistor 10,000 ohm 1/2W. 20%	R-102
R44	Power Supply C.	Resistor, wire wound, adj. 25,000 ohm 25 watts with one adj. lug 20%	T-584
R45	Power Supply C.	Meter Shunt to read full scale 40 MA D. C.	T-600
R46	Power Supply C.	Meter Shunt to read full scale 400 MA D. C.	T-601
R47	Power Supply C.	Meter Shunt to read full scale 400 MA D. C.	T-601
R48	Power Supply C.	Resistor Composition 33,000 ohm 1/2W. ±10% insulated	T-598
R49	Power Supply C.	Resistor wire wound adj. 20,000 ohms 50 watt with 2 mounting brackets and 4 adj. lugs	T-582
R50	Power Supply C.	Resistor wire wound 60,000 ohm 10W. 20%	T-587
R51	Power Supply C.	Resistor wire wound adj. 2,000 ohm 25 watts with one adj. lug	T-583
R52	Power Supply C.	Resistor Composition 100,000 ohm 2W. ±10%	R-71
R53	Power Supply C.	Resistor wire wound special heater	T-588
R55	Power Supply C.	Resistor Composition 100,000 ohm 2W. ±10%	R-71
R59	Power Supply C.	Resistor Carbon 22,000 ohm 1W. 10%	R-59
R62	Power Supply C.	Resistor 2,000 ohm 10W. 10% Ohmite	R-101
C1	VFO	Cap. Ceramic Tubular 100 MMF ±1% Zero-Temp. uninsulated type	T-727
C2	VFO	Capacitor Variable	T-620
C3	VFO	Capacitor 25 MMF APC	T-314
C4	VFO	Capacitor Ceramic Tubular 100 MMF ± 10 MMF Zero Temp. Coeff.	T-646
C5	VFO	Capacitor Disc .001 MF	T-509
C6	VFO	Capacitor Disc .001 MF	T-509
C7	VFO	Capacitor Ceramic Tubular 75 MMF ± 7.5 MMF, —750 Neg. Temp. Coeff.	T-647
C8	VFO	Capacitor Disc .001 MF	T-509
C9	VFO	Capacitor Disc .001 MF	T-509
C78	VFO	Capacitor Ceramic Tubular 75 MMF ±1% Zero Temp. Coef. uninsulated	T-751
C79	VFO	Temp. Comp. Cap. N-750 ±120K 5±0.1 MMF	T-749
C80	VFO	Temp. Comp. Cap. N-750 ±120K 50± 1 MMF	T-750
C10	Buffer Xtal Osc.	Capacitor Ceramic Tubular 50 MMF ±5MMF —750 Neg. Temp. Coeff.	T-616
C11	Buffer Xtal Osc.	Capacitor Ceramic Tubular 95 MMF ±9.5 MMF —750 Neg. Temp. Coeff.	T-643
C12	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509
C13	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509
C14	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509

PARTS LIST - MODEL 5100 TRANSMITTER

Circuit Symbol	Sub. Assy. Location	Description	B & W Part #
L12	Multiplier F.A.	Parasitic Choke	T-714
L13	Multiplier F.A.	Parasitic Choke	T-714
L14	Multiplier F.A.	Parasitic Choke	T-714
L15	Multiplier F.A.	R. F. Choke Plate	T-710
L16	Multiplier F.A.	High Frequency Coil	T-722
L17	Multiplier F.A.	Low Frequency Coil Pi-Network	T-721
L18	Modulator S.A.	R. F. Choke Filament	T-359
L19	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L20	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L21	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L22	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L23	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L24	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L25	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L26	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L27	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L28	Power Supply C.	R. F. Choke 2.5 uhy	T-359
V1	VFC	6BJ6 Vacuum Tube	T-645
V2	Buffer Xtal Osc.	6BJ6 Vacuum Tube	T-645
V3	Buffer Xtal Osc.	6BJ6 Vacuum Tube	T-645
V4	Multiplier F. A.	6AQ5 Tube	T-284
V5	Multiplier F. A.	6AQ5 Tube	T-284
V6	Multiplier F.A.	6AQ5 Tube	T-284
V7	Multiplier F.A.	6AQ5 Tube	T-284
V8	Multiplier F.A.	6146 Tube	T-553
V9	Multiplier F.A.	6146 Tube	T-553
V10	Modulator S.A.	6U8 Vacuum Tube	T-635
V11	Modulator S.A.	6AQ5 Vacuum Tube	T-284
V12	Modulator S.A.	6146 Vacuum Tube	T-553
V13	Modulator S.A.	6146 Vacuum Tube	T-553
V14	Power Supply C.	OD3/VR150	T-128
V15	Power Supply C.	OC3/VR105	T-196
V16	Power Supply C.	5R4G Vacuum Tube	T-605
V17	Power Supply C.	5R4G Vacuum Tube	T-605
V18	Power Supply C.	5V4 Vacuum Tube	T-606
T1	Modulator S.A.	Transformer, driver	T-548
T2	Modulator S.A.	Transformer Modulation	T-549
T3	Power Supply C.	Transformer High Voltage	T-545
T4	Power Supply C.	Transformer Filament & Low Voltage	T-544
X	Buffer Xtal Osc.	Crystal Socket	T-361
CH1	Power Supply C.	Choke, power supply 5 hy	T-546
CH2	Power Supply C.	Choke, power supply 8 hy	T-547
CH3	Power Supply C.	Choke, power supply 8 hy	T-547
TB1	Power Supply C.	Barrier Strip	T-638
TB2	Power Supply C.	Terminal Strip 10 Terminal Special	T-604
I-1	Power Supply C.	Neon Lamp miniature bayonet base	T-597
	Power Supply C.	Relay Control	T-589
	Power Supply C.	Meter 3" rectangular base	T-599
	Power Supply C.	Fuse Holder	T-602
		Fuse 5 Amp. 125 volt	T-603
	Power Supply C.	2 Line Filters	T-680
	Power Supply C.	TVI Filter	Model 426
	Front Panel— Dial Assy.	2 Pilot Lights	T-703

INSTRUCTION MANUAL - MODEL 5100 TRANSMITTER

ADDENDA SHEET #1

NOTE

The following changes have been made to current production units. These changes are not indicated by the schematic diagram in the present instruction manual, however, the parts list is up to date and includes the items used for the changes indicated below. —

1. Add 2 Resistors R60 & R61 — 100K, 2 watts in parallel, shunted across secondary of Modulation transformer T2.

2. Add 2K Resistor 10 watts R62 from terminal #3 on V15 to ground.

3. Connection change on high voltage screen feed suppy lead — from SW4 section (C) contact #3 to J#5 terminal #3.

4. Buffer — XTAL — OSC. Unit — change circuit symbol reading P2 to read J9.

5. Multiplier Final Amplifier — change value of C44 from .005 MMF. to read .005 MF.

6. Add 10,000 ohm 1/2 watt 20% Resistor (R63) in series with high side of microphone lead. Change to take place inside of chassis, under shield cover.

7. MICROPHONE CORD CONNECTOR FITTING
The Microphone Cord Connector (Not Supplied) is an Amphenol 80-MC2M. Refer to page 6 of the instruction Manual for proper wiring polarity.

8. CAMLOCK FASTENERS
Reference to the 2 Camlock Fasteners and cutaway drawing contained on page 6 under the title of "Maintenance" should be deleted. These items have been omitted due to the difficulty they produced in withdrawing the chassis from the Cabinet.

9. MODEL 5100 TUNING GUIDE
The following dial settings are average when the Model 5100 Transmitter is terminated into a 75 ohm non-inductive load circuit. Antenna loads should be such that the following settings be approximated as closely as possible.
Final plate current for the following settings is 220 ma. in the "FONE" position. "CW" position will vary somewhat from this value.

10. CAUTION
When no microphone is attached to the front panel connector, the audio gain control **MUST** be retarded to the full counter-clockwise position. Failure to do so may produce arcing at the modulation transformer output safety gap.

DIAL SETTINGS

Frequency (KC's)	Loading	Tuning
3500	3.0	8.0
4000	5.0	6.0
7000	2.0	5.0
7300	2.5	4.5
14000	2.0	4.5
14350	2.1	4.0
21000	3.0	2.5
21450	3.1	2.5
26960	2.0	4.0
27230	2.0	4.0
28000	2.0	3.5
29700	2.5	2.5

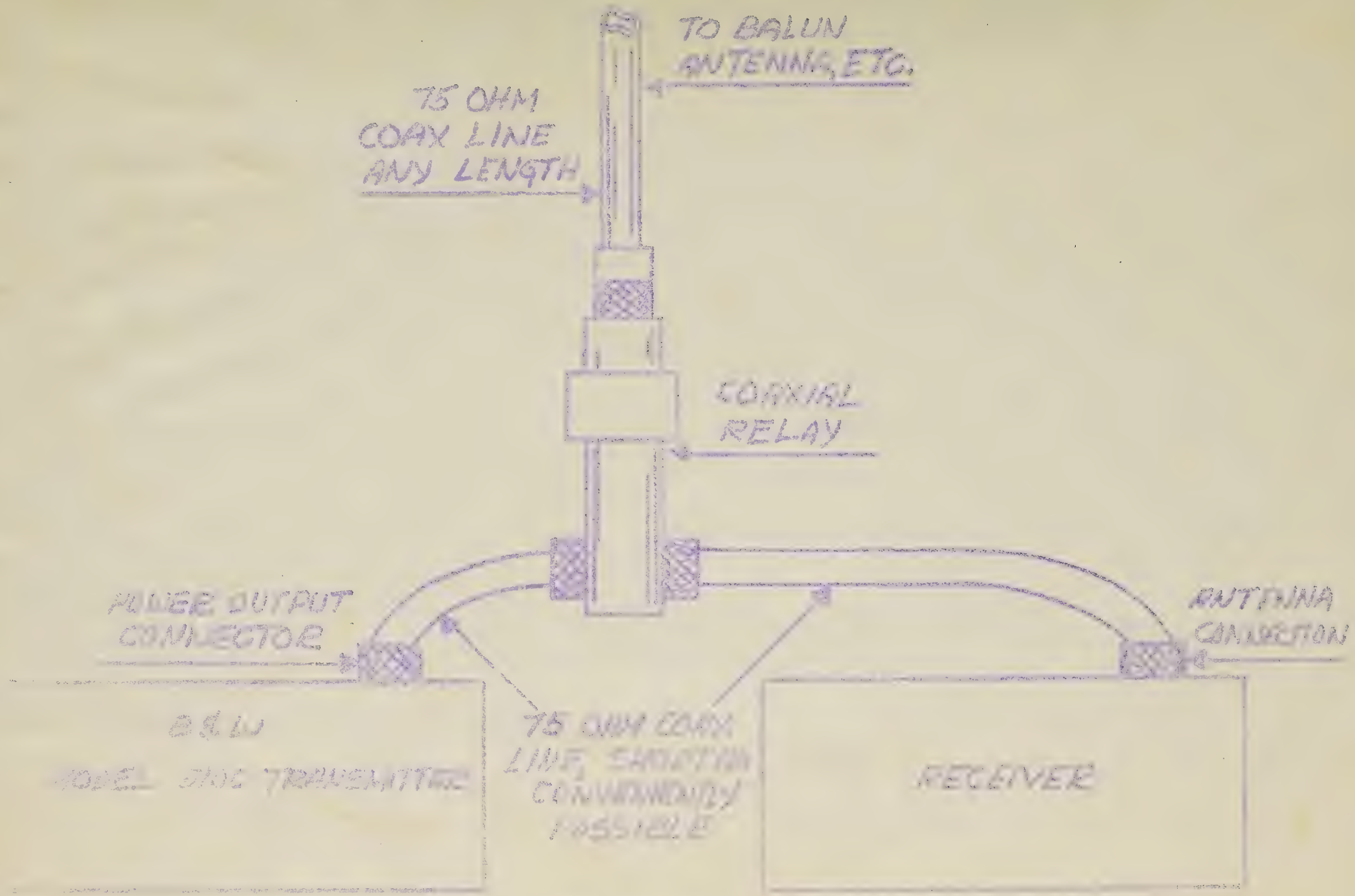
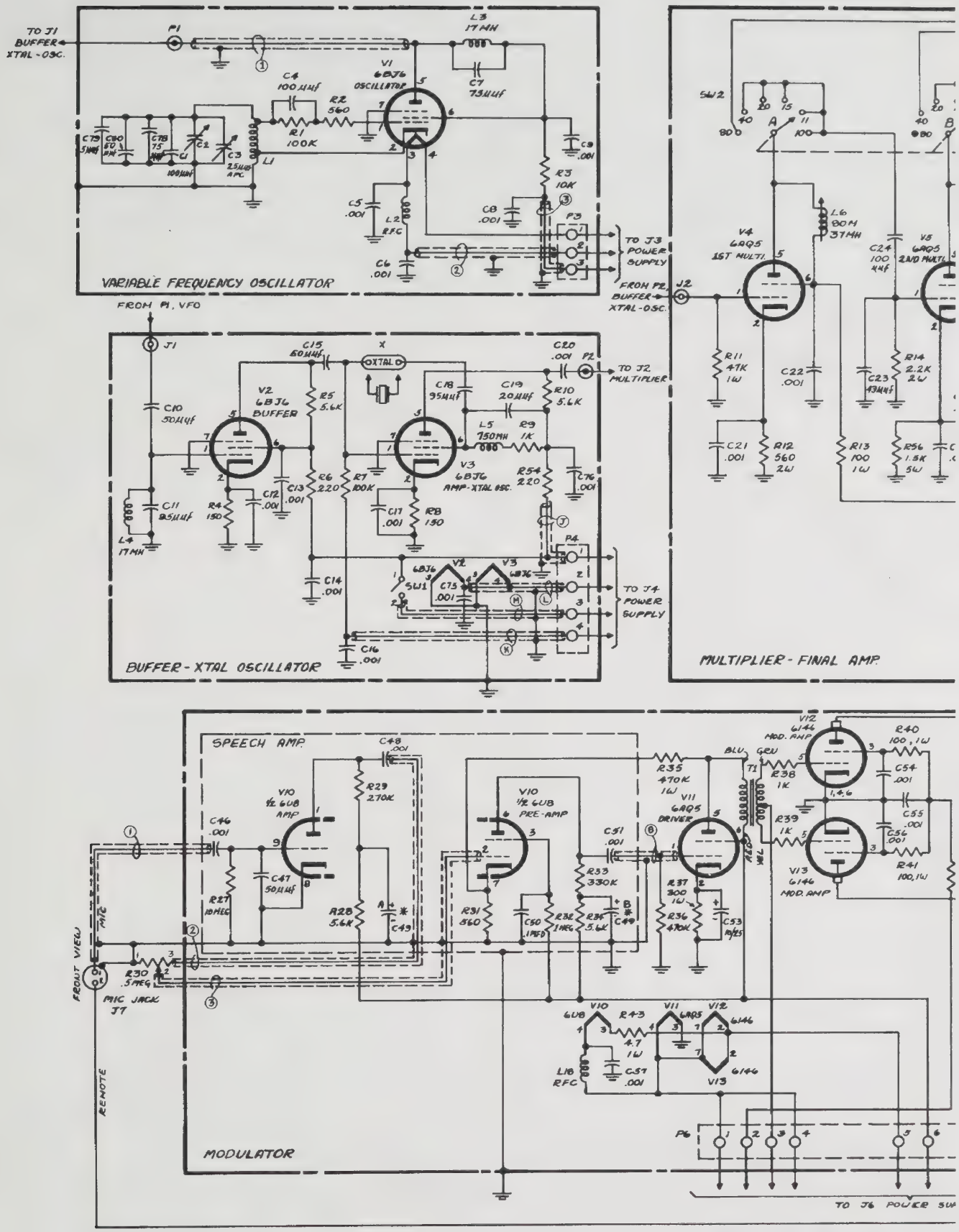
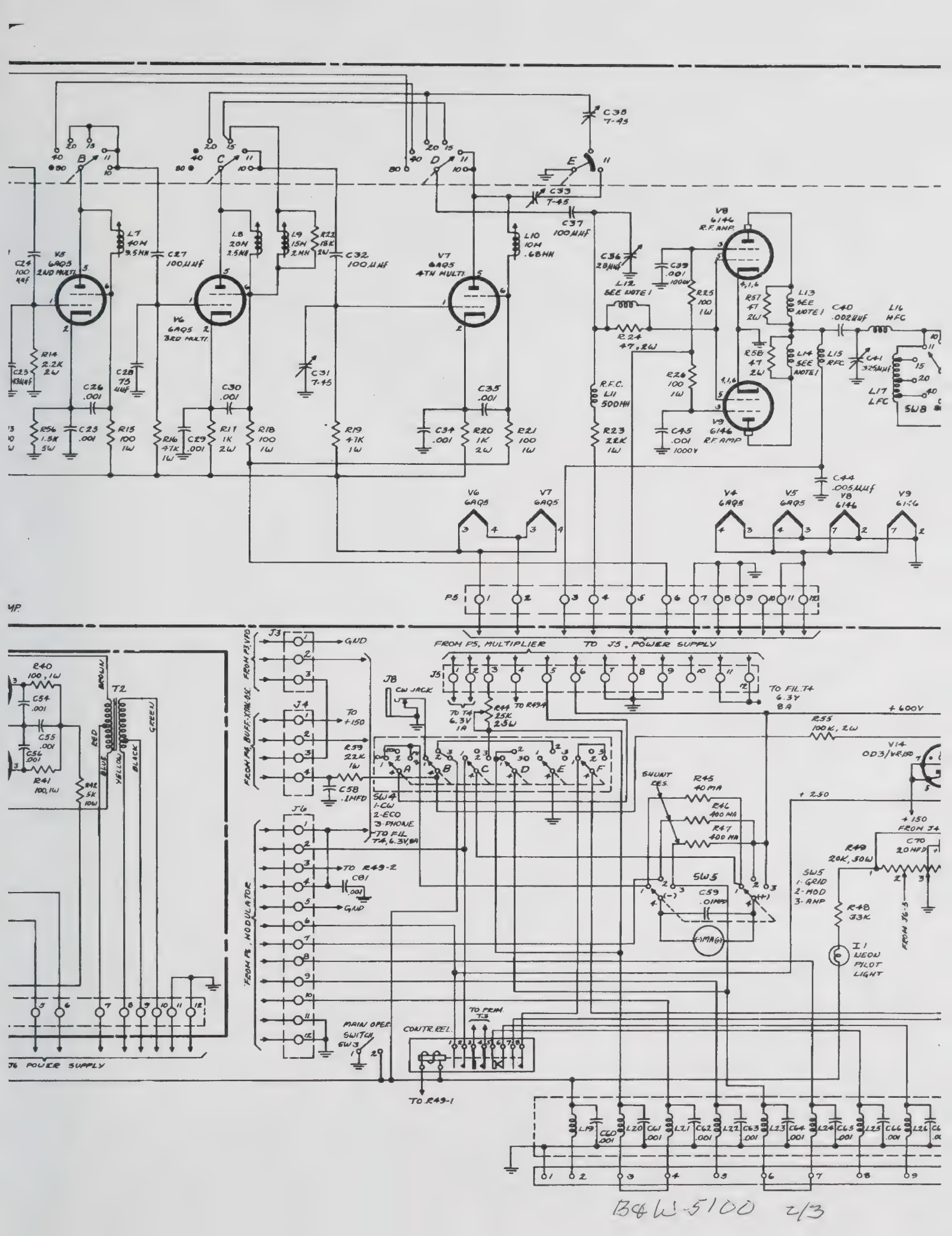


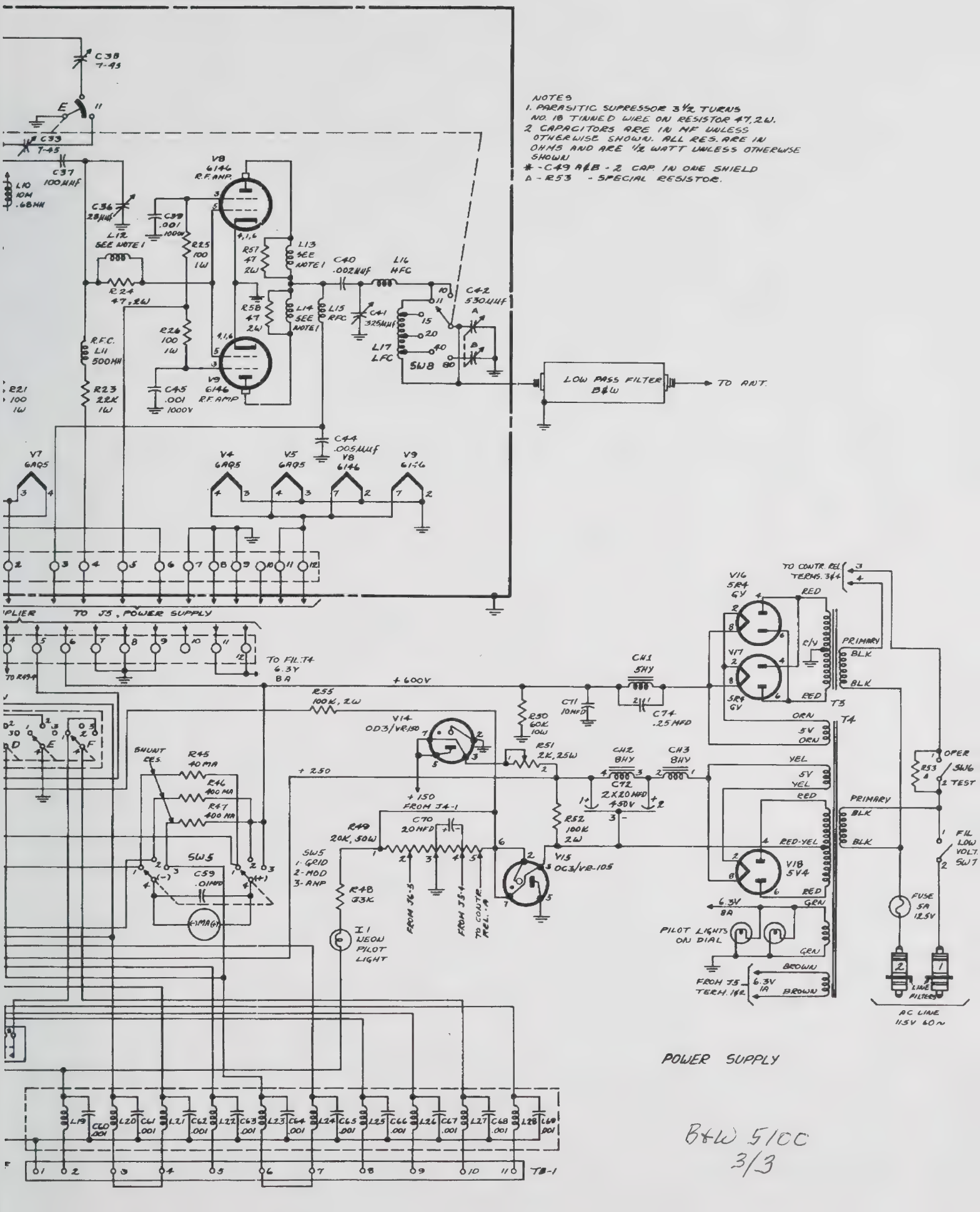
FIG. HOOK-UP SHOWING RELATION OF RECEIVER-TRANSMITTER
ETC. COAXIAL ANTENNA CHANGEOVER RELAY.


VARIABLE FREQUENCY OSCILLATOR
BUFFER - XTAL OSCILLATOR
MULTIPLIER - FINAL AMP.
MODULATOR
SPEECH AMP.
TO J1 BUFFER XTAL - OSC.
FROM P1, VFO
TO J3 POWER SUPPLY
FROM P2, BUFFER - XTAL - OSC.
TO J2 MULTIPLIER
TO J4 POWER SUPPLY
MIC JACK J7
FRONT VIEW
REMOTE
TO J6 POWER SU
V1 6BJ6 OSCILLATOR
V2 6BJ6 BUFFER
V3 6BJ6 AMP-XTAL OSC.
V4 6AQ5 1ST MULTI.
V5 6AQ5 2ND MULTI.
V10 1/2 6U8 AMP
V10 1/2 6U8 PRE-AMP
V11 6AQ5 DRIVER
V12 6146 MOD. AMP
V13 6146 MOD. AMP
L1
L2 RFC
L3 17 MH
L4 17 MH
L5 750 MH
L6 80 M 37 MH
L7 RFC
L8 RFC
C1
C2
C3 2.5 UUF APC.
C4 100 UUF
C5 .001
C6 .001
C7 73 UUF
C8 .001
C9 .001
C10 50 UUF
C11 85 UUF
C12 .001
C13 .001
C14 .001
C15 60 UUF
C16 .001
C17 .001
C18 95 UUF
C19 20 UUF
C20 .001
C21 .001
C22 .001
C23 43 UUF
C24 100 UUF
C46 .001
C47 50 UUF
C48 .001
C49
C50 .1 MFD
C51 .001
C53
C54 .001
C55 .001
C56 .001
C57 .001
R1 100K
R2 560
R3 10K
R4 150
R5 5.6K
R6 220
R7 100K
R8 150
R9 1K
R10 5.6K
R11 47K 1W
R12 560 2W
R13 100 1W
R14 2.2K 2W
R27 10 MEG
R28 5.6K
R29 270K
R30 .5 MEG
R31 560
R32 1 MEG
R33 330K
R34 5.6K
R35 470K 1W
R36 470K
R37 300 1W
R38 1K
R39 1K
R40 100, 1W
R41 100, 1W
R43 4.7 1W
R54 220
R56 1.5K 5W
SW1
SW2
T1
P1
P2
P3
P4
P6
J1
J2
XTAL
6U8
6AQ5
6146

B&W 5100
1/3


V5 6AQ5 2ND MULTI.
V6 6AQ5 3RD MULTI.
V7 6AQ5 4TH MULTI.
V8 6146 R.F. AMP.
V9 6146 R.F. AMP
V4 6AQ5
V5 6AQ5
V8 6146
V9 6146
V6 6AQ5
V7 6AQ5
L7 40M 3.5MH
L8 20M 2.5MH
L9 15M 2MH
L10 10M .68MH
L11 500MH
L12 SEE NOTE 1
L13 SEE NOTE 1
L14 SEE NOTE 1
L15 RFC
L16 RFC
L17 LFC
C27 100 MMF
C32 100 MMF
C37 100 MMF
C38 7-45
C33 7-45
C31 7-45
C36 28 MMF
C40 .002 MF
C41 325 MMF
R22 18K 2W
R24 47, 2W
R25 100 1W
R26 100 1W
R23 22K 1W
R57 47 2W
R58 47 2W
R14 2.2K 2W
R56 1.5K 5W
R15 100 1W
R16 47K 1W
R17 1K 2W
R18 100 1W
R19 47K 1W
R20 1K 2W
R21 100 1W
C23 .001
C24 100 MMF
C26 .001
C28 75 MMF
C29 .001
C30 .001
C34 .001
C35 .001
C39 .001 1000V
C45 .001 1000V
C44 .005 MF
P5
FROM P5, MULTIPLIER
TO J5, POWER SUPPLY
J5
TO FIL. T4 6.3V 8A
TO T4 6.3V 1A
TO R49A
R44 25K 2.5W
+600V
R55 100K, 2W
V14 OD3/VR150
+250
+150 FROM J4
R49 20K, 50W
C70 20 MFD
R48 33K
I1 NEON PILOT LIGHT
FROM P6-5
SW5 1-GRID 2-MOD 3-AMP
SHUNT RES.
R45 40 MA
R46 400 MA
R47 400 MA
C59 .01 MFD
E-MA(-)
(-)
(+)
J3
GND
J4
TO +150
R39 22K 1W
C58 .1 MFD
FROM P6, BUFF.-XTAL OSC.
J6
TO R49-2
C81 .001
GND
FROM P6, MODULATOR
SW4 1-CW 2-ECO 3-PHONE
TO FIL. T4, 6.3V, 8A
J8
CW JACK
MAIN OPER. SWITCH SW3
CONTR. REL.
TO PRIM. T3
TO R49-1
R40 100, 1W
C54 .001
C55 .001
C56 .001
R41 100, 1W
R42 5K 10W
T2
BROWN
RED
BLUE
YELLOW
BLACK
GREEN
76 POWER SUPPLY
L19
C60 .001
L20
C61 .001
L21
C62 .001
L22
C63 .001
L23
C64 .001
L24
C65 .001
L25
C66 .001
L26

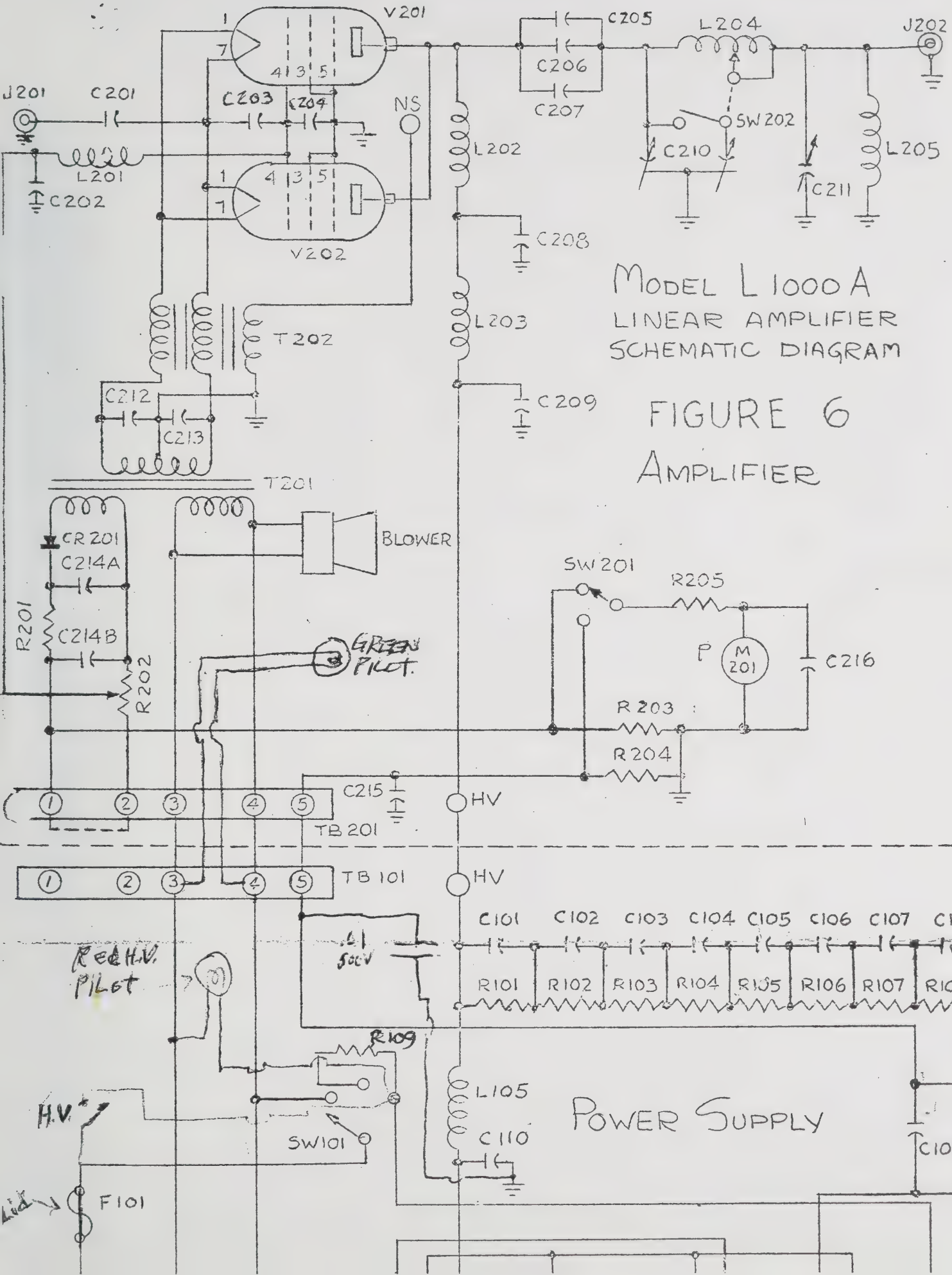
B&W-5100 2/3


NOTES
1. PARASITIC SUPPRESSOR 3½ TURNS NO. 18 TINNED WIRE ON RESISTOR 47, 2W.
2 CAPACITORS ARE IN MF UNLESS OTHERWISE SHOWN. ALL RES. ARE IN OHMS AND ARE ½ WATT UNLESS OTHERWISE SHOWN
* - C49 A&B - 2 CAP IN ONE SHIELD
Δ - R53 - SPECIAL RESISTOR.
C38 7-45
C33 7-45
C37 100 MMF
L10 10M .68MH
C36 28 MMF
L12 SEE NOTE 1
V8 6146 R.F. AMP.
C39 .001 1000V
R25 100 1W
R57 47 2W
L13 SEE NOTE 1
C40 .002 MMF
L16 RFC
C42 530 MMF
R24 47, 2W
R58 47 2W
L14 SEE NOTE 1
L15 RFC
C41 325 MMF
R26 100 1W
V9 6146 R.F. AMP
R.F.C. L11 500MH
R23 22K 1W
C45 .001 1000V
L17 LFC
SW8
LOW PASS FILTER B&W
TO ANT.
C44 .005 MMF
V7 6AQ5
V4 6AQ5
V5 6AQ5
V8 6146
V9 6146
TO MULTIPLIER
TO J5, POWER SUPPLY
TO FIL. T4 6.3V 8A
+600V
R55 100K, 2W
V14 OD3/VR150
R50 60K 10W
C11 10MFD
C74 .25 MFD
CH1 5HY
R51 2K, 25W
CH2 8HY
CH3 8HY
C72 2X20 MFD 450V
+250
+150 FROM J4-1
R49 20K, 50W
C70 20 MFD
R52 100K 2W
V15 OC3/VR105
SW5 1-GRID 2-MOD 3-AMP
SHUNT RES.
R45 40 MA
R46 400 MA
R47 400 MA
C59 .01 MFD
R48 33K
I1 NEON PILOT LIGHT
FROM J5-5
FROM J5-4
TO CONTR. REL. A
V16 5R4 GY
V17 5R4 GY
V18 5V4
TO CONTR. REL. TERMS. 3&4
RED
PRIMARY
BLK
C/Y
T3
T4
ORN
5V ORN
YEL
5V YEL
RED-YEL
GRN
6.3V 8A
PILOT LIGHTS ON DIAL
BROWN
FROM J5 TERM. 1&2
6.3V 1A
R53 Δ
OPER
SW6
TEST
FIL. LOW VOLT. SW7
FUSE 5A 125V
LINE FILTER
AC LINE 115V 60~
POWER SUPPLY
L19 C60 .001
L20 C61 .001
L21 C62 .001
L22 C63 .001
L23 C64 .001
L24 C65 .001
L25 C66 .001
L26 C67 .001
L27 C68 .001
L28 C69 .001
TB-1

B&W 5100
3/3

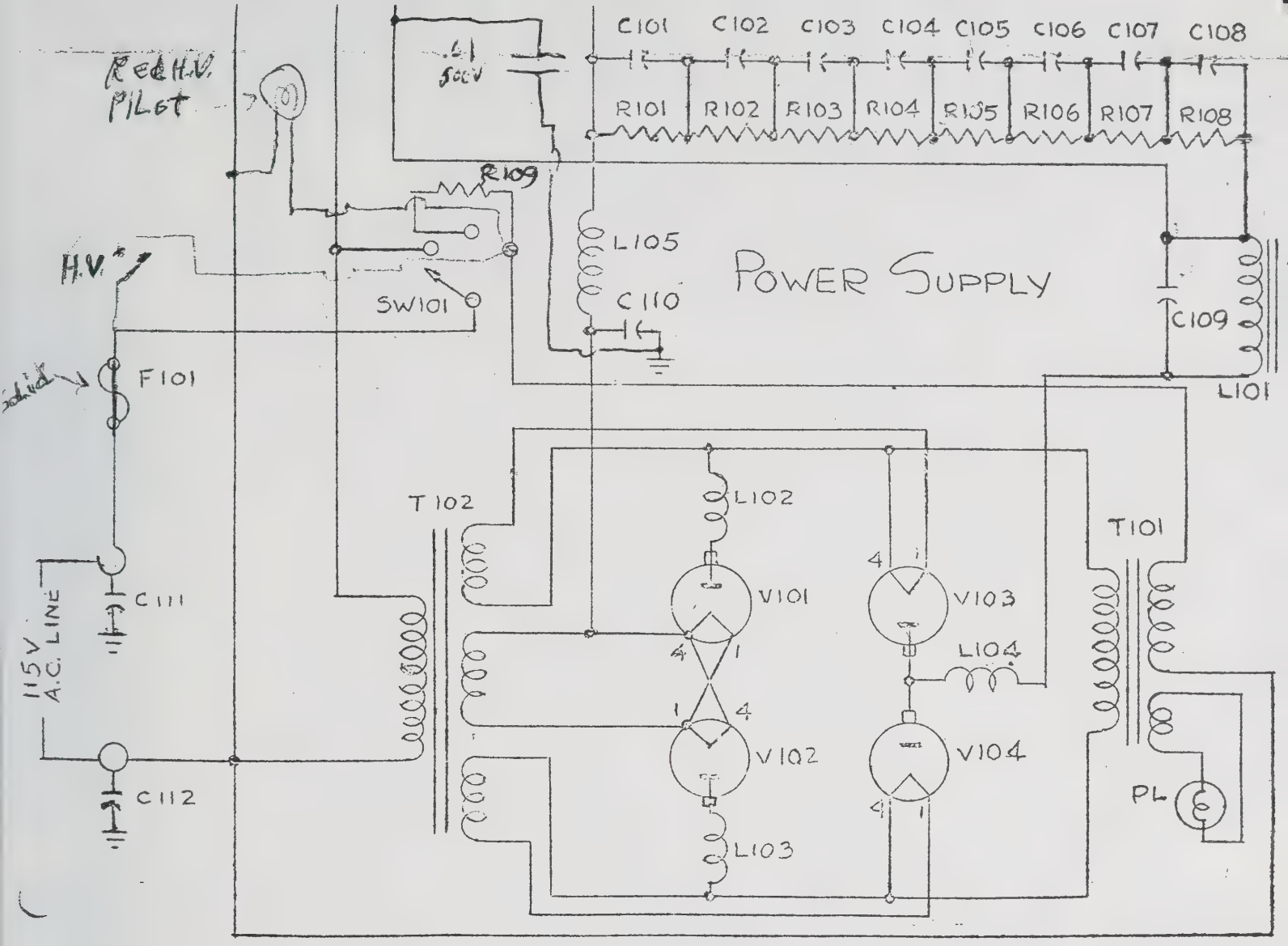
L-1000A

B+LV



MODEL L1000A
LINEAR AMPLIFIER
SCHEMATIC DIAGRAM

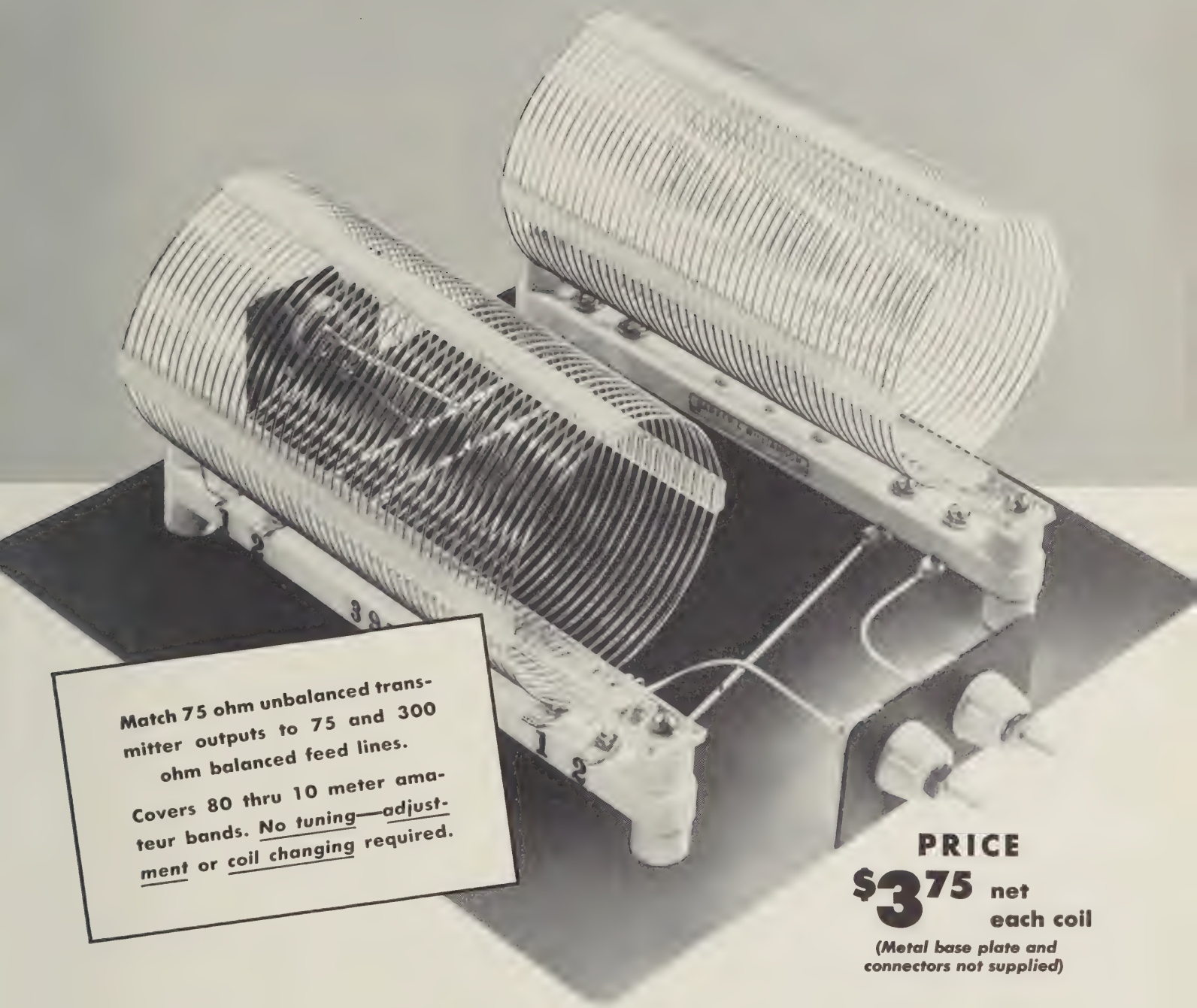
FIGURE 6
AMPLIFIER


Red H.V. PILOT
.01 500V
C101
C102
C103
C104
C105
C106
C107
C108
R101
R102
R103
R104
R105
R106
R107
R108
R109
L105
C110
POWER SUPPLY
C109
L101
H.V.
SW101
F101
C111
115V A.C. LINE
C112
T102
L102
V101
V103
L104
V102
V104
L103
T101
PL

L-1000

B&W Balun Coils

TYPE 3975



Match 75 ohm unbalanced transmitter outputs to 75 and 300 ohm balanced feed lines.

Covers 80 thru 10 meter amateur bands. No tuning—adjustment or coil changing required.

PRICE

$3.75 net each coil

(Metal base plate and connectors not supplied)

THESE sturdy bifilar air-wound inductors may be used for impedance matching in both transmitters and receivers. When two of these coil units are assembled and wired together conforming to wiring instructions, the assembly will provide a multiband Balun type impedance matching device which can be used to meet the following impedance matching requirements.

1. Unbalanced 75 ohms to balanced 75 ohms as shown in Fig. 1.

2. Unbalanced 75 ohms to balanced 300 ohms as shown in Fig. 2.

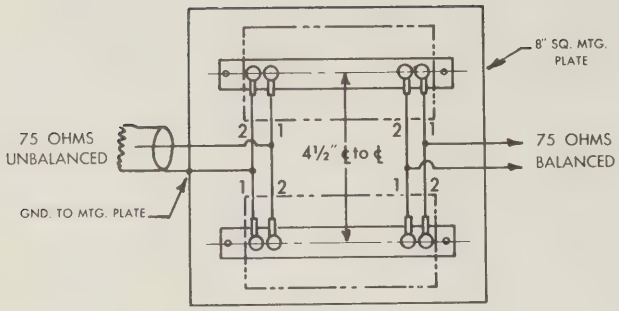


Fig. 1

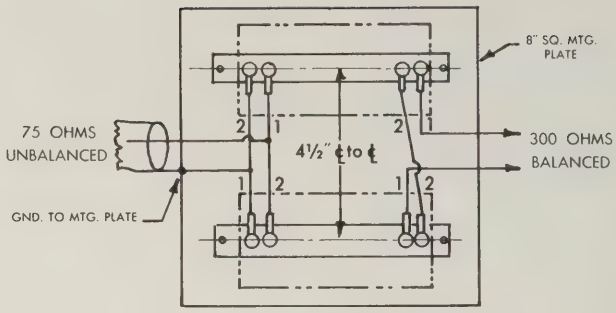


Fig. 2

THE BALUN — HOW IT WORKS

The word "Balun" is derived from a combination of the two words "Balance" and "Unbalance". Thus any device bearing the name "Balun" implies balance to unbalance and vice-versa.

Baluns can be made for single band operation; several of these types for use in amateur applications have been described in technical articles published by various radio magazines.

For greater detail in theory and operation, reference is made to the article titled, "The Impedance Matcher", by Vince DeLong and Ben W. Roberts, on page 20 of C. Q. Magazine, May, 1951.

This bifilar type balun is essentially a parallel wire transmission line wound into the form of a coil which acts as an R-F choke, effectively isolating the input and output of the transmission line.

Since each B & W type 3975 balun coil has an inherent characteristic impedance of 150 ohms, 75 ohms is acquired by paralleling the inputs of two type 3975 coil units, while 300 ohms is obtained by connecting their outputs in series. This connection provides a transformation ratio of 4 to 1.

By paralleling both the input and output circuits of these two coils, the impedance value of each coil is reduced to exactly half of their respective normal value of 150 ohms, thus providing the impedance matching value of 75 to 75 and a transformation ratio of 1 to 1.

Because the construction of this type Balun fixes the impedance relationship, it cannot be used for any impedances other than those given above.

CONSTRUCTING AN IMPEDANCE MATCHER

Figures 1 and 2 show how two B & W type 3975 coils may easily be mounted and wired together. Selection of either one of the two wiring examples will provide for proper match between 75 ohm unbalanced transmitter outputs to 75 or 300 ohm balanced feed line systems.

The assembly should be mounted on a metal plate at least 8″ x 8″ with the coil centers spaced not less than 4½″.

The unbalanced ground should be connected to the mounting plate with as short a lead as possible.

The unbalanced side of the unit should employ a suitable coax connector while a pair of ceramic feed through insulators result in a convenient method of connecting the unit to the balanced feed line system.

Placing the Balun in a metal box for purposes of shielding is not recommended. Doing so may limit the heat dissipating qualities of the coils in addition to adversely affecting the impedance relationships.

PRACTICAL APPLICATIONS

The completed impedance matching unit may be connected as shown in figure 3. The B & W low pass filter is an optional accessory for reducing TVI by attenuating harmonics above 30 megacycles and is recommended in such troublesome cases.

A booklet titled "Filter-Facts" covering details on proper use of B & W Low Pass Filters and Faraday Shielded Links and a wealth of information on how to lick your TVI, is available by sending 15 cents in coins or stamps to the factory.

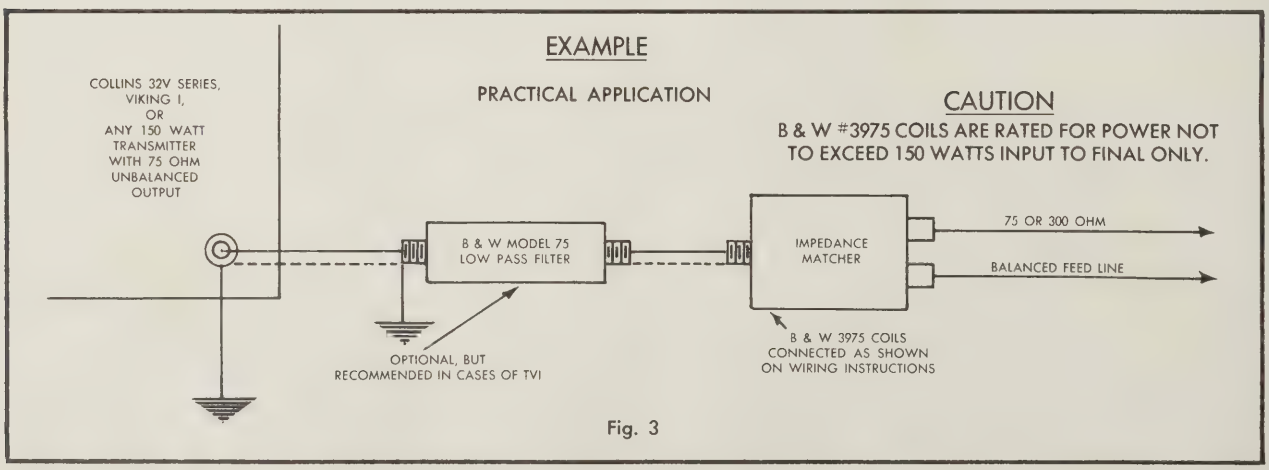


Fig. 3

BARKER & WILLIAMSON, Inc.

237 Fairfield Avenue • Upper Darby, Penna.

1S3975—10M—1254

Printed in U.S.A.

BARKER & WILLIAMSON

BROADCAST EQUIPMENT

INDEX

WARRANTY

Barker & Williamson guarantees each product to be free from defects in material and workmanship for 90 days from date of purchase. The warranty applies to the original purchaser only and we will repair or replace the product at our discretion. Warranty is voided if product is subjected to misuse, neglect, accident, improperly installed or used in violation of the instructions furnished by us. Barker & Williamson reserves the right to make improvements and change in design at any time without obligation to update previously manufactured models. This warranty is given in lieu of any other warranty, expressed or implied.

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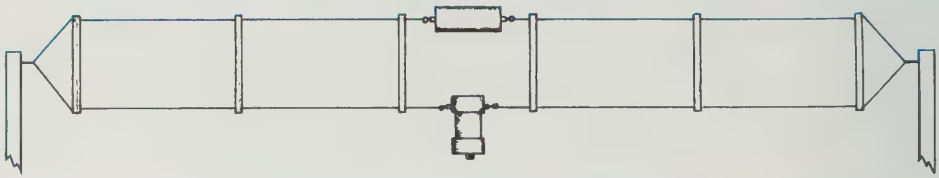
ANTENNAS FOR COMMERCIAL SERVICE



Model AC 3.5-30
(formerly 370-15)

CONTINUOUS COVERAGE FOLDED DIPOLE ANTENNA FOR 3.5-30 MHz
Power Rating 1KW (2KW PEP) ICAS

This new and patented design covers all frequencies from 3.5 to 30 MHz with a VSWR of less than 2:1 when fed with 50 ohm coaxial cable. No adjustments to the antenna or to antenna tuners are needed when changing frequency. The Model AC 3.5-30 antenna is the logical companion to modern solid state transmitters & receivers that require no tuning when making frequency changes. Use of this antenna is so simple that untrained personnel can operate it.

The AC 3.5-30 is constructed from rugged time-proven materials. Thousands of them are in service world-wide in all kinds of climates, from the tropics to the arctic regions. The antenna can be installed as a flat-top dipole, an inverted V, or a sloper. A minimum height of 25 feet is recommended, but the antenna may be used at lower heights with reduced efficiency. The higher the installation the more effective a radiator the antenna will be, particularly at lower frequencies.

The Model AC 3.5-30 covers the amateur 80, 40, 30, 20, 18, 15, 12, and 10 meter bands. Although the antenna is designed for commercial services, many amateurs are delighted with its performance on the ham bands, and for covering MARS frequencies. When compared to a resonant dipole on the lower frequency bands, the AC 3.5-30 radiates a signal approximately 2 S-units below a dipole cut to a specific frequency. At higher frequencies there is gain over a dipole because of the length of the AC 3.5-30. Amateurs like its ability to work over an entire band, such as 75 – 80 meters, without an antenna tuner.

Model AC 3.5-30 Supplied fully assembled. Shipping Wgt. 10 lbs. Length 90 ft. overall
US Patent No. 4,423,423

Model AC 2-22
(formerly 370-15/185)

CONTINUOUS COVERAGE FOLDED DIPOLE ANTENNA For 2 to 22 MHz

The same antenna as the Model 3.5-30 except for length, 185 feet overall, wire spacing 36 inches and frequency coverage.

US Patent No. 4,423,423
Shipping Wgt. 19 lbs.

Model AC 5-30
(formerly 370-15/65)

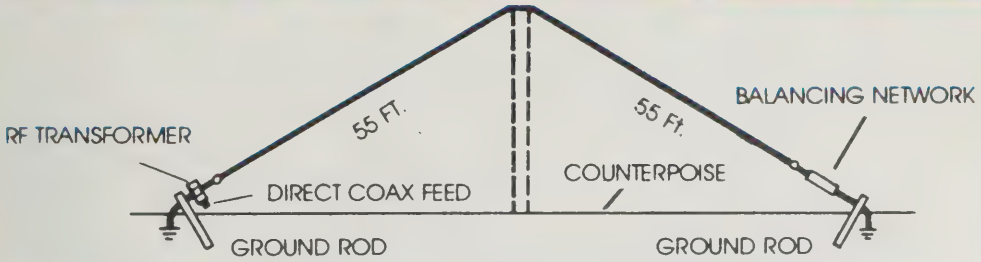
CONTINUOUS COVERAGE FOLDED DIPOLE ANTENNA For 5 to 30 MHz

Identical to Model AC 3.5-30 antenna, except for its length, 65 feet overall, and frequency coverage.

US Patent No. 4,423,423
Shipping Wgt. 10 lbs.

LOOK FOR THE BARKER & WILLIAMSON TRADEMARK . . . YOUR ASSURANCE OF QUALITY ELECTRONIC PRODUCTS

ANTENNAS FOR COMMERCIAL SERVICE



Model AC 1.8-30 CONTINUOUS COVERAGE END-FED VEE ANTENNA
Power Rating 1KW (2KW PEP) ICAS

The Model AC 1.8-30 radiates and receives on all frequencies from 1.8 to 30 MHz, with a VSWR of less than 2:1 when fed with 50 ohm coaxial cable. It features a special nonresonant design that maintains the impedance constant as the frequency is changed. The overall size of the antenna is very small compared to the wavelengths that it covers.

The AC 1.8-30 antenna system is made up of a 110 foot long wire in an inverted V configuration, terminated at one end by a special compensating network that is grounded, usually to a simple 4 foot ground stake. The center of the antenna is the high point, 20 to 25 feet high. The support for the center may be a pole, tree, or any convenient tie point. The other end is the driving point. Coaxial cable is connected to the antenna by means of a balun transformer. One side of the balun is also grounded by means of a simple stake. A counterpoise wire joins the two ground locations. This counterpoise wire is essential in roof mountings or other locations where uncertain ground conditions may exist.

The AC 1.8-30 is an omnidirectional antenna at the lower frequencies, with predominately high angle radiation which is most useful for transmissions of 40 to 1000 miles. From approximately 5 to 15 MHz the radiation at lower angles increases, and above 15 MHz the antenna becomes more directive in the line of antenna, toward the end terminated by the compensating network.

For installations where space is restricted, the AC 1.8-30 may be shortened in length by cutting equal portions of wire from each leg. This reduces the radiation efficiency as the antenna is shortened, but it still "talks", and many radio systems are functioning with reliable and consistent communications by means of shortened AC 1.8-30 antennas. The impedance characteristics are not much affected by changes in antenna length, so that the SWR remains less than 2:1 over the frequency range.

Model AC 1.8-30 Supplied fully assembled
Shipping Wgt. 7 lbs.

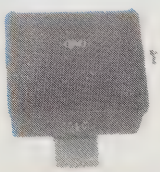
US Patent No. 4,511,898

Model AC 1.8-30M Same specifications as above except built to rugged marine standards. Consult factory.
Shipping Wgt. 10 lbs.

Model BN-1 BALANCING NETWORK

2 KW continuous duty balancing network for Models AC 1.8-30 and AC 3.5-30 antennas. Usable up to 5 KW intermittent duty (SSB, CW).
Shipping Wgt. 30 lbs.
Dimensions: 34" H × 15½" × 13" D

Model HFT-5 MATCHING TRANSFORMER



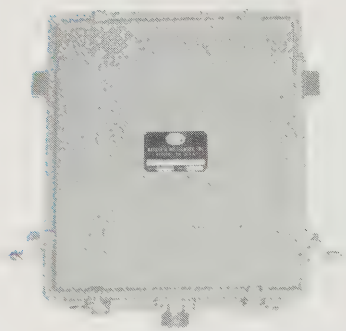
5 KW continuous duty matching transformer for use with Model AC 1.8-30 and AC 3.5-30 antennas.
Shipping Wgt. 18 lbs.
Dimensions: 18" × 15" × 7" D

Model HFT-1 MATCHING TRANSFORMER

1 KW continuous duty matching transformer for Models AC 1.5-30 and AC 3.5-30 antennas. Usable up to 2.5 KW intermittent duty (SSB & CW).
Shipping Wgt. 5 lbs.
Dimensions: 10" × 10" × 4" D

ANTENNA BALUNS

Baluns are RF transformers that match a balanced antenna to an unbalanced coaxial cable feedline.



The HFT series of baluns for military and commercial service is rated for 5 KW average output power, 10 KW ICAS. Frequency range is 3 to 30 MHz. Each balun is supplied in a weather-proof fiberglass case, approximately 12″ by 12″ by 7″ deep. Shipping weight is 18 lb. Supplied with UG-352/U female connector and a UG-154/U male connector, other types available on request.

Each balanced ouput impedance is available with either 50 Ohm or 70 Ohm unbalanced input.

B&W Model No	Input Impedance (unbalanced)	Output Impedance (balanced)	Power Capacity
HFT 5K/500/7008	50 ohms	700 ohms	5-KW Average 10 KW PEP
HFT 5K/500/6008		600 ohms	
HFT 5K/500/3008		300 ohms	
HFT 5K/500/2008		200 ohms	
HFT 5K/700		as above	
As Above	70 ohms		

DUMMY LOADS

Rhombic Antenna Terminators

The DL series of non-inductive resistors is designed for terminating rhombic and long wire V antennas, and for outdoor dummy load service. Each has a value of 600 Ohms, with other resistance loads available on special order.

The larger units are housed in weather-proof fiberglass boxes that provide screened vents for convective air cooling. Typical input VSWR is less than 1.5 to 1 from DC to 30 MHz.

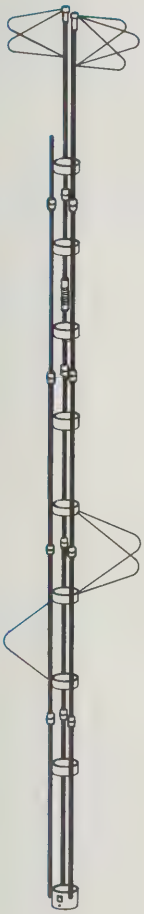
Model Number	Power Rating	Case size	Shipping weight
DL-100/600	100 watts	$2\frac{1}{2}$″ dia × $6\frac{1}{2}$″	1 lb
DL-500/600	500 watts	11″ × 13″ × 7″ deep	8 lb
DL-2K/600	2000 watts	28″ × 14″ × 12″	35 lb
DL-6K/600	6000 watts	65″ × 53″ × 32″	170 lb

NOTE: The following abbreviations appear in this catalog:

CW	Continuous Wave (Code)	RTTY	Radioteletype
ICAS	Intermittent Commercial Amateur Service	SWR	Standing-Wave Ratio
MARS	Military Affiliate Radio System	SSB	Single Sideband
PEP	Peak Envelope Power	VSWR	Voltage Standing-Wave Ratio

Model AV-25

SIX BAND VERTICAL ANTENNA WITH NO TRAPS!



Covers 80, 40, 30, 20, 15, and 10 meters.
Can be supplied for commercial, military, or MARS frequency. Only 25 feet high.

Direct coax feed, low SWR.

Three parallel elements are combined to make this rugged vertical antenna. It is resonant on each band, yet no traps are included. Top and side capacity loading are used to reduce the overall height and achieve wide bandwidths.

Get good DX reports with this low-angle radiator!

Thin-walled steel conduit (EMT) having a heavy galvanized coating is used for durability and strength. Insulating rings are used to space the elements from each other, and as the base of the antenna. A radial system is needed for top performance.

Shipping Wgt. 38 lbs.

THEORY

The top-loaded quarter wave element for 40 meters is also resonant as three quarter waves on 15 meters, tuned by side capacitive loading. Similarly, the 30 meter element also tunes to 10 meters. A large coil in the third element is an rf choke at 14 MHz, isolating a quarter wave on 20 meters from the top of the element. On 75 or 80 meters the coil loads the entire element, including some top capacitance, to bring it into resonance.

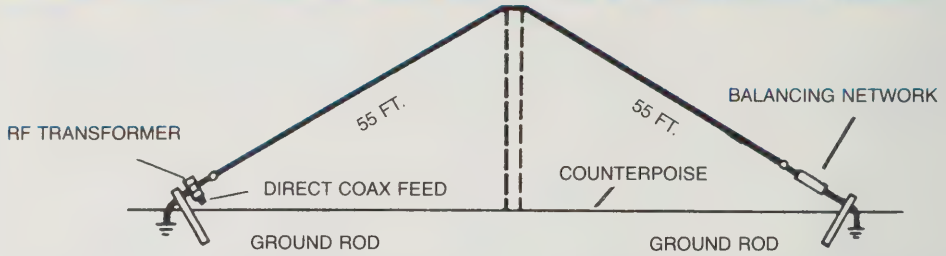
Model AR-25 Radial Kit. Sixteen resonant wires to be used in a radial system for ground or roof mounting of the AV-25 vertical antenna.

B & W VERTICAL BEAM ANTENNAS

Currently under development is a new line of vertical beam antennas covering the new high frequency bands. These will be announced following completion of the electrical and environmental testing. In the meantime, if you have specific interest or requirements, please contact the factory. Your inquiries will be given prompt and careful consideration.

ANTENNAS FOR AMATEUR SERVICE

Model AC 1.8-30 CONTINUOUS COVERAGE END-FED VEE ANTENNA

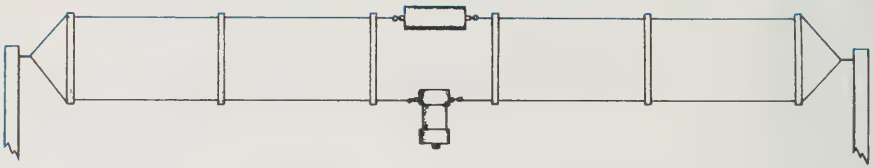


Originally designed for commercial and marine use, the AC 1.8-30 Antenna is finding increasing acceptance by amateurs as an ideal all-round antenna where ground area is limited. We have been receiving excellent performance reports on 160 meters.

See page 3 (Commercial Antenna Section) for description.

U.S. Patent No. 4,511,898

Model AC 3.5-30 CONTINUOUS COVERAGE FOLDED DIPOLE ANTENNA



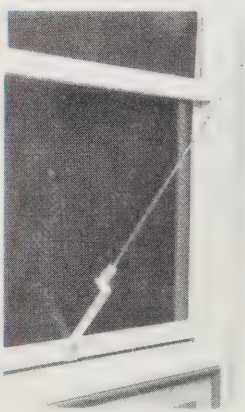
This unique Barker & Williamson antenna was designed to provide optimum performance and reliability as an all-band communications antenna. The AC 3.5-30 is in service the world over, serving many commercial and government installations. Its flat response has made it a favorite with amateurs, too.

For complete description see page 2 (Commercial Antenna Section).

U.S. Patent No. 4,423,423

Model AP-10
(formerly 370-10)

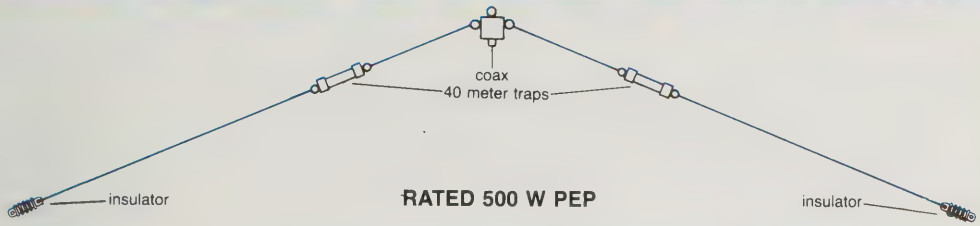
PORTABLE AMATEUR ANTENNA FOR APARTMENTS, HOTELS, AND TRAVEL



Designed especially for those renters and travelers who cannot put up a permanent antenna, the AP-10 attaches quickly to a window. It tunes to low SWR with the aid of its counterpoise wire and puts out a remarkably potent signal on the 40, 30, 20, 18, 15, 12, CB, 10, 6, and 2 meter bands. Power rating is 300 watts CW and SSB. A new heavy-duty 40 meter coil is included. The AP-10 consists of an aluminum bracket which clamps to a window, a 10 ft. length of coax to connect the antenna to your radio, a set of loading coils which mount on a solid plastic-base insulator, a stainless steel whip which extends from 22-1/2″ to 57″, and an insulated counterpoise wire, 33 feet long. In use, a coil is selected for the desired band, 20 meters, for example, and attached to the antenna base with two screws. The whip is attached and extended, and the antenna is then clamped to the window with a large thumbscrew built into the window bracket. (Either vertically raised window sashes or horizontally sliding, or casement windows can be used). The counterpoise wire is then unrolled to the "20" mark where approximately 16 feet extends across the floor or along the wall of the room. With only a little power from the transmitter the length of the counterpoise is then adjusted by rolling up the wire, to bring the SWR down to a minimum, close to 1:1. The system is now matched and resonant and ready to radiate and receive quite effectively, despite the limitations of length and location. Thousands of these antennas are keeping hams on the air and working lots of DX. Have an AP-10 on hand for emergency work, don't be "off the air" because of an ice or wind storm!

Shipping Wgt. 3 lbs.

ANTENNAS FOR AMATEUR SERVICE



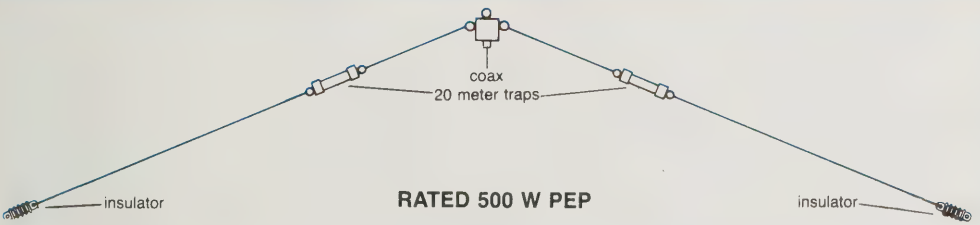
Model AT-110
(formerly 370-11)

FIVE BAND TRAP ANTENNA FOR 80, 40, 20, 15, and 10 METERS

This popular antenna is only 110 feet long and handles the highest amateur power. SO-239 coaxial cable connector for five band operation with one feedline. Antenna may be set-up as a flat-top, inverted V, or sloper. Wire length adjustments provided for tuning. The AT-110 has low SWR on 80 and 40 meters, but somewhat higher SWR on 20, 15, and 10 meters. Typical values are from 2:1 to 3:1 on these bands. An antenna tuner is recommended if a solid state rig will be used.
Shipping Wgt. 5 lbs.

Model AT-110K
(formerly 370-12)

Above antenna supplied as a kit consisting of #14 stranded copperweld antenna wire, center connector, two traps, end insulators, and complete instructions.
Shipping Wgt. 5 lbs.



Model AT-55
(formerly 370-13)

FOUR BAND TRAP ANTENNA FOR 40, 20, 15, and 10 METERS

Only 55 feet long, this trap dipole antenna provides efficient operation on four bands with one feedline. It has the same construction and ratings as the AT-110.
Shipping Wgt. 4-3/4 lbs.

Model AT-55K
(formerly 370-14)

The AT-55 four band trap antenna, supplied as a kit. Consists of #14 stranded copperweld antenna wire, center connector, two traps, end insulators, and complete instructions.
Shipping Wgt. 4-3/4 lbs.

Important Message — Please Read!

When installing an antenna, please observe the following rules:

Antenna or lead-in wires must *never* cross over power lines. Make every effort to avoid their crossing under power lines. Locate antenna and lead-in as far from power lines as possible. When installing antenna, do not use a metal ladder, or work on a wet or windy day. If antenna or mast starts to fall, get out of the way and let it fall free.

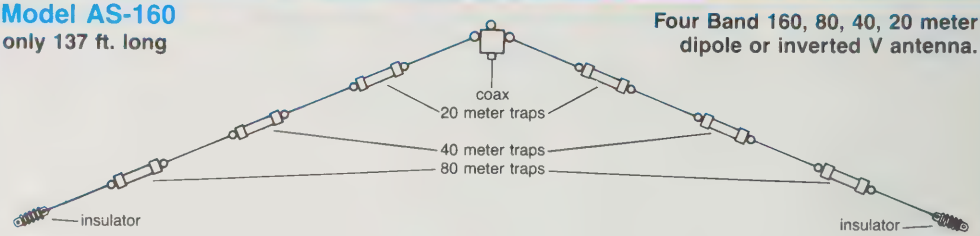
Do not work alone. Have someone nearby who understands the danger of electrocution.

In the event that your antenna system should come in contact with a power line, phone your power company for assistance; do not attempt to remove it yourself.

AMATEUR ANTENNAS FOR LIMITED SPACE

Model AS-160
only 137 ft. long

Four Band 160, 80, 40, 20 meter dipole or inverted V antenna.

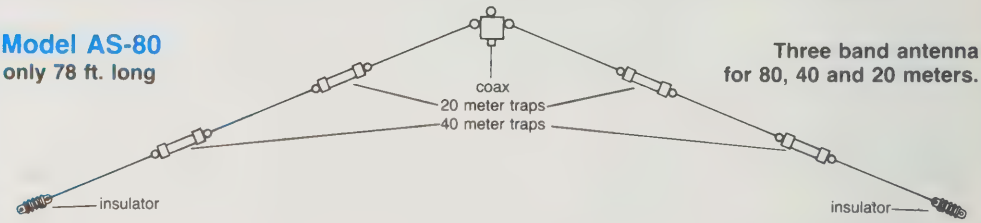


The Model AS-160 is nearly half the length of a half-wave antenna of 160 meters, yet it is an efficient resonator on the "top band". And it gives excellent results on the 80, 40 and 20 meter bands as well. Three sets of traps isolate a full half-wave on each band to the inside sections of the antenna. An antenna tuner is recommended for solid state transmitters on 160 meters to provide greater operating range and a better match. It is supplied with a SO-239 connector for direct feed with 50 ohm coax.

The Model AS-160, as well as all antennas on this page, is rated 500 W PEP. (with the exception of Model AXS-160).

Model AS-80
only 78 ft. long

Three band antenna for 80, 40 and 20 meters.



The Model AS-80 is similar in construction to the AS-160 above. Where space is at a premium this antenna provides excellent coverage of the 80 meter band with only 39 feet of wire on each side of the center connector. The SWR on all three bands is low.

Model AS-40
40, 20, 15, and 10 meter bands.

The Model AS-40 is similar in construction to the AS-160 and consists of three sets of traps for coverage of the 40, 20, 15, and 10 meter bands. Overall length of the AS-40 is 40 ft.

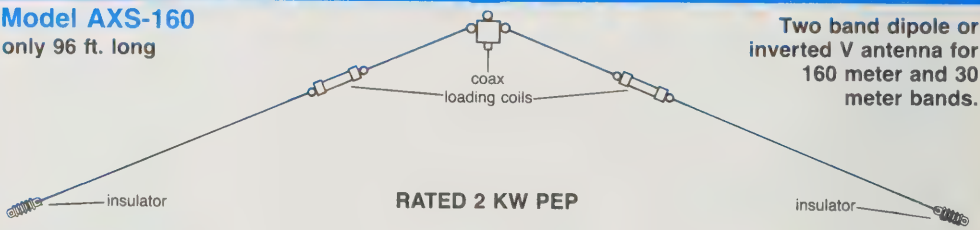
Model AS-20
20, 15 and 10 meter bands.

The Model AS-20 is similar in construction to the AS-80 with two sets of traps covering the 20, 15, and 10 meter bands. Overall length of the AS-20 is 23 feet.

AMATEUR ANTENNAS FOR VERY LIMITED SPACE

Model AXS-160
only 96 ft. long

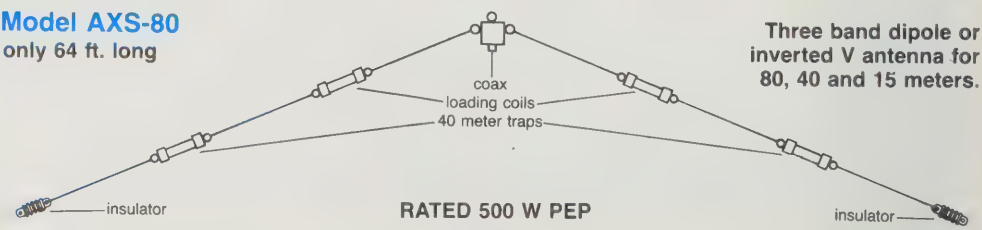
Two band dipole or inverted V antenna for 160 meter and 30 meter bands.



RATED 2 KW PEP

Model AXS-80
only 64 ft. long

Three band dipole or inverted V antenna for 80, 40 and 15 meters.



RATED 500 W PEP

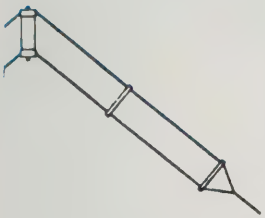
SHIPPING WGTS. (Lbs.):					
	Model AS-160.....8	Model AS-40.....7	Model AXS-160 6
	Model AS-80.....6	Model AS-20.....6	Model AXS-80 6

SHORTWAVE LISTENING ANTENNAS

Model ASW-90
Patent No. 4,423,423

CONTINUOUS COVERAGE SHORTWAVE LISTENING ANTENNA

- Receives all frequencies from 3.5 MHz to 30 MHz
- Only 90 feet long



This antenna is a receive-only version of B & W's famous broadband folded dipole antenna, the AC 3.5-30. When fed with 50 ohm coaxial cable, this antenna has an SWR of less than 2:1 over this entire frequency range. This means that received signals are well matched to your receiver automatically, with no loss due to mismatch. Antennas such as dipoles or longwires will be matched to the low impedance input of a SW receiver at their resonant frequency and at odd multiples of this frequency. For other frequencies about 90% of the spectrum, they will receive signals, but with significant losses caused by mismatching. This remarkable antenna (US Patent Number 4,423,423) keeps the match good and the losses down! It is a large antenna and does a good job on medium wave and longwave reception, too. It features high strength #14 copper-clad wire for long life. It has an SO-239 connector at the center to attach coaxial cable to the antenna. Shipping Wgt. 9 lbs.

Model ASW-60C
Model ASW-60L
(with 50 ft. twin feed line)

EIGHT BAND TRAP ANTENNA

- Only 35 Feet Long

The Model ASW-60 antenna resonates and gives top reception on the 11, 13, 16, 19, 25, 31, 49 and 60 meter shortwave bands. Its remarkable performance is achieved through the use of antenna traps. The ASW-60 may be set up as a horizontal dipole or an inverted V, as sketched above, which gives good reception from all directions. A connector is provided at the center insulator for attaching coaxial cable feedline to the radio. RG-59 cable is recommended.

The antenna is constructed from #16 stranded copper wire for maximum conductivity and reception as well as strength and flexibility. Heavy nylon guy lines are furnished at each end of the antenna. Shipping Wgt. 3 lbs.

Model ASW-5

WINDOW MOUNT ANTENNA FOR SCANNERS AND SHORTWAVE RADIOS

- Hear more stations with an outdoor antenna.
- For Apartments and Travel

The Model ASW-5 antenna is ideal for vacations, traveling, and apartments with antenna restrictions. It easily clamps to a window, and extends out to bring in more stations. It covers the UHF and VHF high and low bands for scanner receivers and does a remarkable job of picking up shortwave signals from distant continents.

The antenna consists of a sturdy aluminum bracket that secures to both vertically raised windows and ones that slide horizontally. A loading coil is mounted on an insulator at the end of the bracket, and a collapsible stainless steel whip that extends from 22 inches to 58 inches is mounted on the insulator. A 10 foot length of coaxial cable is supplied to connect the antenna to your shortwave or scanner receiver.

The antenna may be mounted on practically any support, and be used almost anywhere!
Shipping Wgt. 2 lbs.

Model ASW-100

LONGWIRE ANTENNA

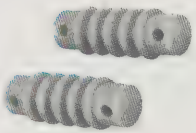
- Fully assembled, not a kit.

The Model ASW-100 is a 100 foot long antenna made with #14 copper-clad steel wire. It is designed to run from a high point on a house such as a chimney or an upper story window, out to a remote point such as a tree, pole, or another building. If your yard will only permit a shorter span, the wire may be bent and/or cut to a shorter length. An insulated lead-in wire is provided to run from the end insulator down and into the house through a window to the receiver. A 25 foot length of braided nylon guy rope is also provided to insulate and secure the far end of the antenna to its support.
Shipping Wgt. 3 lbs.

ANTENNA ACCESSORIES

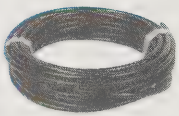
Model AI-5
(formerly 370-5)

ANTENNA END INSULATOR



Fabricated from rugged glass polymer material, these are ideal insulators for both receiving antennas and for transmitting up to the amateur power limit. They will survive a pull of more than 1,000 lbs., and are an excellent electrical insulator. 4" long, with a diameter of 1 1/4". Holes are .270" diameter. Shipping Wgt. 3 oz.

COAXIAL CABLE

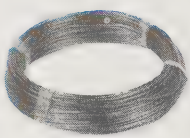


Coaxial cable transmission line for connecting both receiving and transmitting antennas to radios. The RG-8 type cable has a characteristic impedance of 52 ohms and is used for transmitting service. The RG-59 type cable has a 75 ohm impedance and is for receiving and low power transmitting service.

The cables listed below are made up with PL-259 UHF coaxial connectors at each end and are ready to use.

Model Number	Length	Shipping Weight	Model Number	Length	Shipping Weight
RG-8/25	25 ft	2 lb 2 oz	RG-59/25	25 ft	1 lb 4 oz
RG-8/50	50 ft	4 lb 2 oz	RG-59/50	50 ft	2 lb
RG-8/75	75 ft	6 lb 4 oz	RG-59/75	75 ft	3 lb
RG-8/100	100 ft	8 lb 6 oz	RG-59/100	100 ft	3 lb 8 oz

ANTENNA WIRE



The ideal wire for making antennas. Strength is achieved with copper coated steel wire, stranded for greater flexibility and ease of handling. The copper assures excellent conductivity and good soldering properties. The wire is #14 copperweld made up of 7 strands of #22 wire.

Model Number	Length	Shipping Weight
AW-70	70 ft	1 lb
AW-100	100 ft	1 1/2 lb
AW-140	140 ft	2 lb

Larger coils up to 1000 ft available.

Model AC-1

ANTENNA CENTER CONNECTORS

The AC-1 center connector is a combined center insulator for a dipole antenna and an SO-239 connector for attaching coaxial cable to the antenna. Eye bolts for attaching the antenna wire are provided for mechanical strength, and separate electrical connection is provided by wires which are ready to solder to the antenna wire. Stainless Steel Hardware.

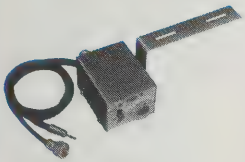
A top eye bolt is provided to support the center of the antenna for an inverted V installation.
Shipping Wgt. 1/2 lb.

Model AC-51
(formerly CC-51)

The Model AC-51 is a military type center insulator and coaxial cable connector. It is made of cast aluminum with steatite insulators at the dipole wire connecting rings. Wing nuts are used to tighten the wire connections, ideal for quick assembly or antenna length modifications. A mounting hole at the top of the AC-51 is provided for center support of an inverted V antenna.
Shipping Wgt. 1 lb.

ANTENNA ACCESSORIES

Model AT-140 — CB ANTENNA MATCHER

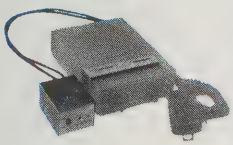


This matcher allows you to use your regular automobile antenna as a CB antenna. Avoid announcing the fact that you have valuable radio equipment in your car to potential thieves. A tuning control and indicator light permits you to match the CB radio to the antenna for top performance for both receiving and talking. A front panel switch changes the antenna back to the car radio for listening to AM or FM.

Dimensions: 2-1/16" × 2-9/16" × 3-1/4" deep.

Shipping Wgt. 1 lb.

Model AT-200 — 2 METER MOBILE ANTENNA MATCHER



This matching unit permits you to use the AM-FM broadcast receiving antenna on your automobile for 2 meter amateur operating.

Don't advertise to potential thieves that you have valuable radio equipment in your car!

The AT-200 tunes from 144 to 148 MHz with front-panel tuning and loading controls. A LED tuning indicator shows maximum output. Supplied with universal mounting bracket and screws.

- Handles 25 watts.
- SWR adjusts to 1.2:1 or less with most antennas
- Motorola receptacle for vehicle antenna cable, coaxial cable outputs to AM-FM set and 2 meter transceiver.
- Front panel switch to transfer antenna to AM-FM radio.
- 2-1/16" × 2-9/16" × 3-1/4" deep.
- Shipping Wgt. 1 lb.

ANTENNA BALUNS

The BC series of baluns for amateur service is rated at 1.5 KW output, CW or SSB. They are furnished with a SO-239 connector for matching a balanced load to 50 ohm coaxial cable.

Model	Impedance	Frequency Range
BC-1	50 Ohms balanced to 50 Ohms unbalanced	1.8-30 MHz
BC-2	200 Ohms balanced to 50 Ohms unbalanced	1.8-30 MHz
BC-3	300 Ohms balanced to 50 Ohms unbalanced	3.5-30 MHz
BC-4	600 Ohms balanced to 50 Ohms unbalanced	3.5-30 MHz

Shipping weight 1½ lbs.

RECEIVING BALUNS

The RC series of baluns is designed to match balanced receiving antennas, such as dipoles, folded dipoles, inverted vees, and others, to an unbalanced transmission line. The baluns with a 50 ohm unbalanced transmission will match to RG-58 and RG-174 coaxial cable, and the 70 ohm unbalanced units will match to RG-59 cable.

Shipping Wgt. 1 lb.

Type	Standard Impedance Ratios	Freq. Range
RC-780	50 ohms balanced to 50 ohms unbalanced	3.5-30 MHz
RC-781	70 ohms balanced to 50 ohms unbalanced	3.5-30 MHz
RC-782	150 ohms balanced to 50 ohms unbalanced	3.5-30 MHz
RC-783	200 ohms balanced to 50 ohms unbalanced	3.5-30 MHz
RC-784	300 ohms balanced to 50 ohms unbalanced	3.5-30 MHz
RC-785	600 ohms balanced to 50 ohms unbalanced	3.5-30 MHz
RC-794	300 ohms balanced to 70 ohms unbalanced	3.5-30 MHz
RC-796	600 ohms balanced to 70 ohms unbalanced	3.5-30 MHz

ANTENNA ACCESSORIES

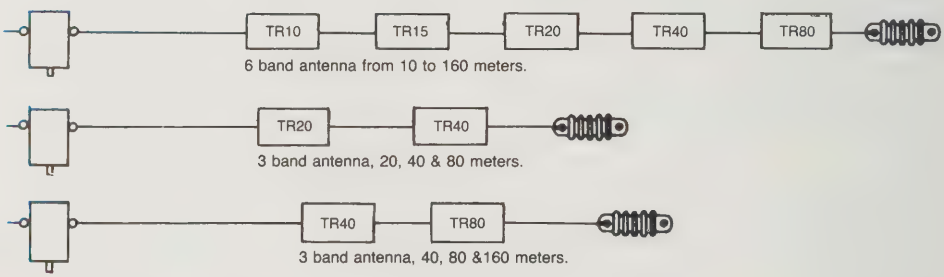
B & W ANTENNA TRAPS

All Barker & Williamson antenna traps are ruggedly constructed for long life under extreme atmospheric conditions. Housed in a weather proof plastic enclosure with stainless steel hardware, they will provide years of trouble-free performance.
Specifications: Size 2-5/8" dia. × 7-1/2" lg. overall
Wgt: 10 oz.
Rated 500 W PEP

Model No.	Band	Res. Freq.	Model No.	Band	Res. Freq.
TR80	80	3.5 MHz	TR20	20	14.0 MHz
TR40	40	7.0	TR20A	20	14.0
TR40A	40	7.0	TR15	15	21.0
TR30	30	10.0	TR10	10	28.0

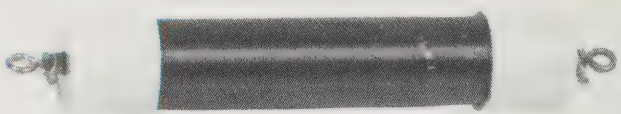
Note: The TR40 and TR20 are higher in inductance than the TR40A and TR20A, which effectively reduces the antenna length.

Some typical applications: (only one arm of the dipole is shown)



B & W LOADING COILS

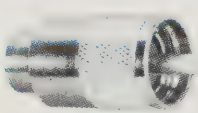
Use one in series with each leg of half-wave dipole antenna to shorten length of antenna. Rated 1KW (2KW PEP)



Model LC-1 Shortens 160 meter antenna by 157 feet per pair.
Size: 1-1/2" dia. × 7" lg. Wgt.: 8 oz. each

Model LC-2 Shortens 80 or 40 meter antenna by 30 to 35 feet per pair.
Size: 1-1/2" dia. × 5" lg. Wgt.: 8 oz. each

MODEL PL-259
(formerly 370-9)



PL-259 connector for use with RG-8 coaxial cable. UHF type, mates with SO-239 connector.

AIR-WOUND INDUCTORS

AIR WOUND COILS

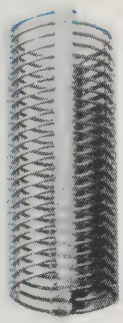
BARKER & WILLIAMSON air wound inductors have been an industry standard since their introduction in 1932. They offer high Q and mechanical stability, and come in a variety of sizes. Diameters from 1/2 inch to six inches are in stock, coil lengths to 10 inches, and wire sizes from AWG #24 to #8. The coils are wound with tinned solid copper wire that is embedded in plastic ribs. Other finishes, such as silver plated, bare copper, or enamel insulation are available on special order.

Two coil styles are available. MINIDUCTOR coils have flat lightweight ribs, while the AIR DUX coils are wound into heavier rods that form the ribs. AIR DUX coils are also supplied with Lexan rod ribs. Add "L" to the model number and 10% to the price to order AIR DUX with Lexan.

See complete listings on following page.

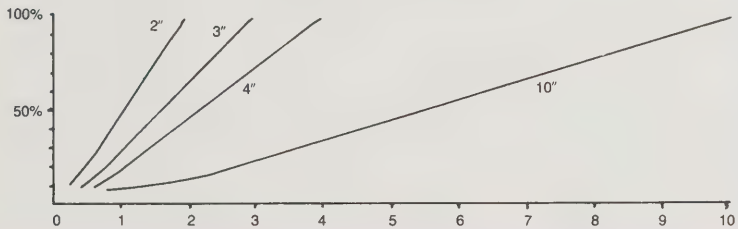
Coils from the MINIDUCTOR and AIR DUX series are electrically identical, provided the sizes, wires, and spacings are the same. They come in different coil lengths for some diameters.

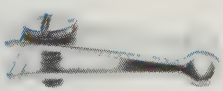
INDUCTANCE



The inductance of each coil is given in the table. Be sure to read the inductance from the column next to the MINIDUCTOR or AIR DUX product number, since the coils having different lengths will of course have different inductances also.

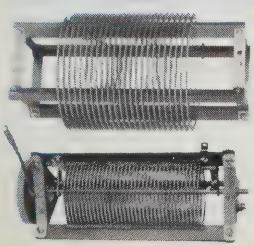
The graphs below may be used to estimate the inductance of shorter coils. The vertical scale gives the percentage of the full coil inductance, and the horizontal scale the length of coil you would use. The four graphs represent the standard lengths of coils available: 2", 3", 4", and 10". Suppose, for example, that a 3.0 microhenry inductor is needed What length of #3014 MINIDUCTOR whose total inductance is 4.1 uh should be used? Since 3.0 is 73% of 4.1, follow the horizontal 73% line over till it meets the graph for 3 inch length coils. About 2.3 inches will be needed. For a #3046 MINIDUCTOR a little less than 1 1/2 inches would be required.





Adjustable clips fasten directly to the wire of MINIDUCTOR and AIR DUX coils for a secure electrical and mechanical contact. The clips are tinned for ease of soldering. Available in packages of 25, 100, and 1,000.

Model 3942	Accommodates up to number 12 wire
Model 3943	Accommodates up to number 8 wire
Model 3944	Clips for large edgewound strip coils.



CUSTOM COIL PRODUCTS

In addition to the standard inductors shown on these pages, Barker & Williamson continues to produce a large variety of coils and coil products for manufacturers in the communication industry. These include edgewound coils, both rotating and fixed, in a wide range of sizes. We are always available to help solve problems of inductor design and production. Your inquiries will receive prompt attention.

AIR-WOUND INDUCTORS

B & W MINIDUCTOR COILS

Part Number	Induct-ance (μH)	Coil Length	Coil Diameter	Turns per Inch	Wire Size
3001	0.18	2"	1/2"	4	18
3036	0.40			6	18
3002	0.72			8	18
3037	1.10			10	18
3003	3.0			16	20
3038	6.75			24	22
3004	12.0			32	24
3005	0.275		5/8"	4	16
3039	0.620			6	18
3006	1.10			8	18
3040	1.70			10	18
3007	4.50			16	20
3041	10.0			24	22
3008	18.0			32	24
3009	0.620	3"	3/4"	4	16
3042	1.40			6	18
3010	2.50			8	18
3043	3.90			10	18
3011	10.0			16	20
3044	23.0			24	22
3012	40.0			32	24
3013	1.0		1"	4	16
3045	2.40			6	18
3014	4.10			8	18
3046	6.60			10	18
3015	17.0			16	20
3047	38.0			24	22
3016	68.0			32	24
3017	2.30	4"	1-1/4"	4	14
3048	5.0			6	14
3018	9.0			8	16

Part Number	Induct-ance (μH)	Coil Length	Coil Diameter	Turn per Inch	Wire Size
3049	14.0	4"		10	18
3019	36.0			16	18
3050	81.0			24	22
3020	145.0			32	24
3051	3.10		1-1/2"	4	14
3052	7.0			6	14
3053	12.5			8	16
3054	20.0			10	18
3055	50.5			16	20
3056	110.0			24	22
3057	200.0			32	24
3021	4.20	4"	1-3/4"	4	14
3058	9.40			6	14
3022	16.50			8	14
3059	26.0			10	16
3023	67.0			16	18
3060	150.0			24	22
3024	270.0			32	24
3061	15.0	10"	2"	4	12
3025	33.0			6	12
3026/3900	59.0			8	14
3027/3907-1	92.0			10	16
3062	238.0			16	16
3063	22.5		2-1/2"	4	12
3029/3905-1	51.0			6	12
3030/3906-1	90.0			8	14
3031	140.0			10	16
3064	32.0		3"	4	12
3033	71.0			6	12
3034	125.0			8	14
3035	198.0			10	16

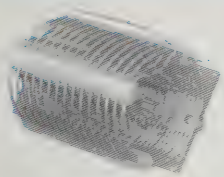
B & W AIRDUX COILS

Model Number	Induct-ance (μH)	Length of Coil (Inches)	In. Dia.	TPI	Wire Size (AWG)
404T	.18	2	1/2	4	18
406T	.40	2		6	18
408T	.72	2		8	18
416T	3.0	2		16	20
432T	12.0	2		32	24
410T	1.10	2		10	18
504T	.275	2	5/8	4	16
506T	.62	2		6	18
508T	1.1	2		8	18
510T	1.7	2		10	18
516T	4.5	2		16	20
532T	18.0	2		32	24
604T	.38	2	3/4	4	16
606T	.86	2		6	18
608T	1.5	2		8	18
610T	2.4	2		10	18
616T	6.1	2		16	20
632T	25.0	2		32	24
804T	1.0	3	1	4	16
806T	2.4	3		6	18
808T	4.1	3		8	18
810T	6.6	3		10	18
816T	17.	3		16	20
832T	68.	3		32	24
1004T	5.9	10	1 1/4	4	14
1006T	14.	10		6	14
1008T	24.	10		8	16
1010T	37.	10		10	18
1016T	96.	10		16	20
1032T	380.	10		32	24
1204T	8.4	10	1 1/2	4	14
1206T	19.	10		6	14
1208T	33.	10		8	16
1210T	52.	10		10	18
1216T	134.	10		16	20
1232T	540.	10		32	24

Model Number	Induct-ance (μH)	Length Of Coil (Inches)	In. Dia.	TPI	Wire Size (AWG)
1404T	12.	10	1 3/4	4	14
1406T	27.	10		6	14
1408T	45.	10		8	14
1410T	75.	10		10	16
1416T	192.	10		16	18
1432T	770.	10		32	24
1604T	15.	10	2	4	12
1606T	33.	10		6	14
1608T	59.	10		8	14
1610T	92.	10		10	16
1616T	240.	10		16	18
2004T	23.	10	2 1/2	4	12
2006T	51.	10		6	12
2008T	90.	10		8	14
2010T	140.	10		10	16
2404T	32.	10	3	4	10
2406T	71.	10		6	12
2408T	125.	10		8	14
2410T	200.	10		10	14
3204T	57.	10	4	4	8
3206T	130.	10		6	10
3208T	230.	10		8	12
3210T	360.	10		10	12
4004T	75.	10	5	4	8
4006T	190.	10		6	10
4008T	340.	10		8	12
4010T	530.	10		10	12
4804T	120.	10	6	4	8
4806T	270.	10		6	10
4808T	470.	10		8	12
4810T	740.	10		10	12

AIR-WOUND INDUCTORS

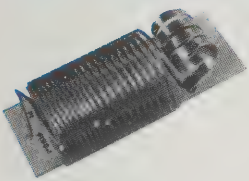
INDENTED COILS FOR CONVENIENT TAPPING



The PI DUX® series of large AIR DUX coils, one to three inches in diameter, have alternate turns indented for ease of connecting taps to the coil. They are supplied with a mounting plate and are designed for use in pi networks.

Model Number	In. Dia.	Turns Per Inch	Wire Size (AWG)	Length of Coil (Inches)
816A	1	16	18	3-3/16
1014A	1 1/4	14	18	2 3/4
1212A	1 1/2	12	16	2 3/4
1411A	1 3/4	11	14	2-5/8
1609A	2	9	14	3
2007A	2 1/2	7	12	3 1/4
2406A	3	6	10	3-5/16

PI-DUX® COMPLETE INDUCTORS FOR PI NETWORK CIRCUITS



The PI DUX® Model 195-1 (500 watts) and Model 195-2 (1,000 watts) are constructed to provide optimum Q in a pi network inductor. The size and spacing of the coil conductor is made progressively larger toward the high frequency end of the inductor. At one end, a heavy strap coil has an inductance of 0.4 microhenry. In the Model 195-1, a variable pitch AIR DUX coil 3" in diameter, wound with #8 wire, provides most of the inductance. The coil spacing is greater toward the strap coil end. In Model 195-2, an intermediate coil section of tubing is placed between the strap coil and the main coil of #8 wire. The inductance at each turn and at tap points marked in the circuits is given in the table below.

MOUNTING

The coils are assembled on a mounting plate which may be mounted by standoff insulators in any position, preferably well spaced from the chassis or shielding.

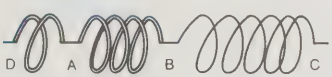
TAP POSITIONS

Colored markings on the coils show the tap locations for an estimated tube load impedance of 1,000 ohms transformed by the pi network into a 50 ohm line on the amateur 10, 15, 20, 40, and 80 meter bands. Designs for other impedances and other frequencies may readily be made by reference to the inductance chart.

Model 195-1 (500 W - 1KW PEP)

strap vari-pitch #8 wire

Model 195-2 (1KW - 2KW PEP)



strap tubing #8 wire

TAPS			Inductance uh	
195-1	195-2	Turns	195-1	195-2
E	A	0	0.4	0.4
		1	0.8	0.45
		2	1.3	0.6
		3	1.6	0.8
	B	4	2.0	1.2
		5	2.7	1.6
		6	3.4	2.2
		7	4.0	2.7
		8	4.7	3.4
		9	5.6	4.2
		10	6.4	5.2
		11	7.2	6.1
		12	7.9	6.9
		13	8.8	8.0
		14	9.3	9.1
		15	10.7	10.0
		16	11.7	11.2
		17	12.7	12.6
		18	13.9	14.0
		19	15.2	15.2
F	C	20	16.4	16.4

MOUNTING COILS

The round ribs of the AIR DUX coils may be used to support large coils. If several turns are removed from one end, 3/8" legs, with a flat where the coil turns had been, can be drilled for mounting screws. Alternatively, 5/16" cable clamps will fit around the legs.

Where a large coil is to be suspended by its wire leads, as an antenna loading coil, for example, the wire should be wrapped around the plastic rib where it leaves the coil. This wrapped support will be many times stronger than the grip the plastic rib has on the coil wire.

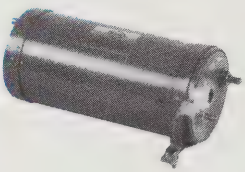
Small coils may often be mounted directly to circuit boards or supported by their wire leads. Some hints for mounting large coils are suggested in the photographs below. A mounting plate may be passed through a coil lengthwise in the slot formed by the ribs and the coil wire. Such a plate can fit between adjacent ribs, or across the coil near the diameter. Plexiglas solvent cement and many other types of glues will secure the mounting plate to the coil.

CHOKES

FILAMENT CHOKES

BARKER & WILLIAMSON filament chokes are designed for commercial and amateur grounded grid amplifiers. They isolate the rf drive that is applied to the cathode from the transformer supplying the heating current. Magnetic shielding is provided internally by ferrite material used as cores in all filament chokes. This permits the chokes to be mounted close to metal without affecting their operation. There are no series resonances below 40 MHz to cause power losses.

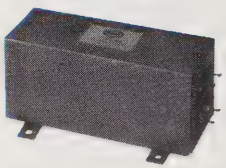
Model FC-50 HIGH POWER FILAMENT CHOKE



The FC-50 is rated for 50 amperes continuous duty. I^2R heating losses are 18 watts at 50 amperes. Choke is supplied with 1/4-20 studs and hardware for electrical connections, and is enclosed in a heavy duty phenolic case.

Frequency:	2 to 30 MHz
Impedance:	Greater than 200 ohms, 2 to 4 MHz Greater than 1,000 ohms, 4 to 30 MHz
Dimensions:	6 inches long, 2-3/4 inches in diameter.
Shipping Wgt:	2 lbs.

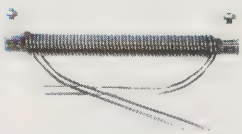
Models FC-15A, FC-30A FILAMENT CHOKES FOR GROUNDED-GRID AMPLIFIERS



The Model FC-15A is a dual-winding choke with a current capacity of 15 amperes. The Model FC-30A is a twin dual-winding choke with a total current capacity of 30 amperes. The four-winding feature of the FC-30A makes it possible to use a separate filament transformer for each set of windings, and also makes it possible to meter each cathode circuit separately.

In both models, "IN" and "OUT" terminals are at opposite ends of the case and in line with each other. Either end may be used for source or load.

Frequency Range:	3.5 MHz to 30 MHz	Dimensions:	2" × 2-1/2" × 5"
RF Voltage:	150 volts rms maximum	Shipping Wgt.:	2 lbs.



Model FC-25A ECONOMY 30 AMP FILAMENT CHOKE

Bifilar wound on 1/2" ferrite core 7" long. Mounting hardware included.

Frequency Range:	1.8 MHz to 30 MHz	Dimensions:	1/2" dia. × 7
RF Voltage:	150 volts rms maximum	Shipping Wgt.:	1 lb.

PLATE CHOKES

Barker & Williamson Plate Chokes are designed for series or parallel feed or high voltage to final amplifiers. Wound on high quality grooved steatite form tapped for 1/4-20 machine screw both ends. Models 800 and 801 plate chokes are 6" long, 5/8" diameter.

Model 800 PLATE CHOKE

90 uH, 750 mA, frequency range 3.5—30 MHz Shipping Wgt. 3/4 lb.

Model 802 PLATE CHOKE

110 uH, 1 amp., frequency range 1.8—30 MHz Shipping Wgt. ¾ lb.

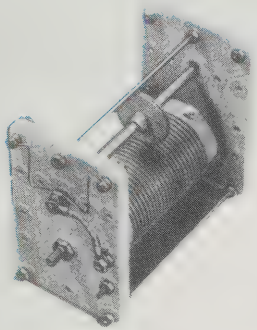
Model BBC-5K PLATE CHOKE

The high-power broadband choke, BBC-5K, has been designed for application in continuous coverage high-frequency transmitters in the commercial or military service. This unit has been designed for high current or high voltage applications. There are no series resonant "suck-out" points in the 1.8 to 30 MHz high frequency spectrum.

Frequency Range:	1.8 — 30 MHz	RF Resistance:	2,000 ohms min.
Power Rating:	5 KW PEP or CW	Reactance:	1,300 Ohms min.
Max DC Voltage:	5 KV	Dimensions:	2-1/4" diameter × 4" high
Mac DC Current:	2 AMP	Shipping Wgt.:	2 lbs.

VARIABLE INDUCTORS

ROTARY INDUCTORS FOR POWER UP TO 750 WATTS CW, 1,500 WATTS SSB



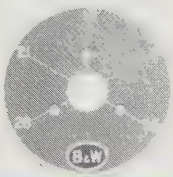
B & W rotary inductors provide a practical method of continuously varying the inductance in a circuit over the entire range of the coil. Ideally suited for use in antenna loading circuits. With proper mechanical coupling to tuning capacitors, a constant LC ratio may be obtained over a wide frequency range. B & W rotary inductors may be connected to short out the unused portion of the coil. Shaft diameter is 1/4", shaft extension is 3/8" for all models.

Model	Inductance (μH)	Height	Width	Length
3851	6.2	4-3/4"	3"	6"
3852	15	4-3/4"	3"	6"
3853	72	3-3/4"	3-1/4"	8-1/2"

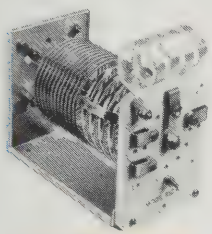
Shipping Weight (all): 2 lb.

BAND-SWITCHING PI-NETWORK INDUCTORS

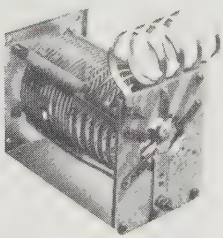
Ideal for that homebrew final. Tune amateur bands 160 through 10 meters. Compact, highly efficient, heavy-duty construction with extra-heavy coils for higher frequencies, best quality insulation for lowest losses and heavy-duty silver-alloy switch contacts for long-time trouble-free operation.



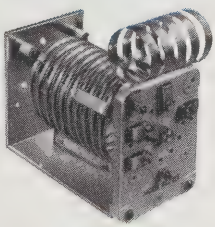
Use Dial Plate Model 3829



Models 850A, 850/160



Model 852



Model 851

SPECIFICATIONS							
Model	Power (watts)	Plate Voltage (VDC)	Plate Load Impedance (ohms)	Output Impedance (ohms)	Inductance Tap Each Band (UH)	Capacity To Resonate Each Band (PF)	Suitable Tube Types
851	AM 250 CW/SSB 500	AM 1250 @ 200 MA CW/SSB 2000 @ 250 MA	2500-5000	50-75	14, 6.3, 1.6, 0.8, 0.52	150, 80, 70 55, 50	Single Tube: 4-125A, 4-250A 4-400A, 813 Parallel (2 or 4 Tubes) Shunt Fed: 807, 837, 6146, 811, 6DQ5
852	AM 1000 CW/SSB 2000	2000-4000	1500-3000	50-75 unbalanced	7, 3.72, 2.34, 1.34, 0.95	268, 144, 73 48.5, 36	Single Tube: 4-CX-1000A, PL-172, 3-1000Z Parallel (2 Tubes)3-400Z-8877 etc.
850A	AM 1000 CW/SSB 2000	2000-4000	2500-5000	50-75 unbalanced	13.6, 6.5, 1.75, 1.0, 0.8	150, 80, 70 55, 50	Single Tube or Parallel (2 Tubes) Series or Shunt Fed: 813, 4-125A, 4-250A, 4-400A, 4-1000A
850/160	AM 1000 CW/SSB 2000	2000-4000	2500-5000	50-75 unbalanced	27, 13.6, 6.5, 1.75, 1.0, 0.8	300, 150, 80, 70, 55, 50	Single Tube or Parallel (2 Tubes) Series or Shunt Fed: 813, 4-125A, 4-250A, 4-400A, 4-1000A

Dimensions (L × W × H): Model 851 - 7 × 3 × 3-1/2; Model 852 - 10 × 4-1/2 × 8;
Models 850A, 850/160 - 10 × 4-1/2 × 7-1/2

Shipping Wgt.: Model 851 - 3-1/2 lbs.; Models 852, 850A, 850/160 - 7-1/2 lbs.

COAXIAL SWITCHES

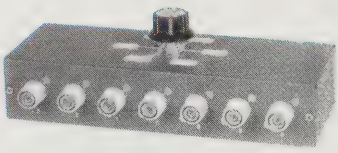
ADD OPERATING CONVENIENCE AND PROFESSIONAL APPEARANCE TO YOUR STATION

BARKER & WILLIAMSON coaxial switches are made from the finest materials: heavy duty silver plated switch contacts, ceramic switch decks, and rugged steel enclosures. They handle the legal amateur power with ease and low SWR.

The attractive CS series of switches in rectangular boxes is designed for the HF bands from 1.8 to 30 MHz. All connectors are on one surface, and the box may be wall mounted by means of holes in the back, or rest on a surface. Cross-talk, measured at 30 MHz, is −45 dB between adjacent outlets and −60 dB between alternate outlets. Impedance is 50 to 75 ohms, VSWR less than 1.2 to 1, DC to 30 MHz. VSWR less than 1.5 to 1 to 150 MHz.

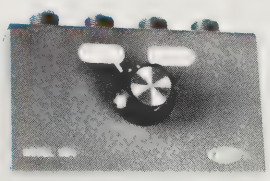
Model CS-3G (formerly 593)

Single Pole:	Three position switch with unused positions grounded. SO-239 UHF coaxial connectors.
Dimensions:	5″ × 3″ × 1-3/4″ deep
Shipping Wgt.:	1 lb.



Model CS-6G (formerly 595)

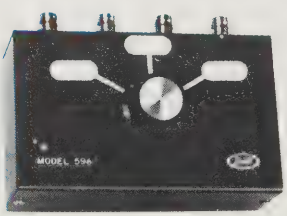
Single Pole:	Six position switch with unused positions grounded. SO-239 UHF coaxial connectors.
Dimensions:	8-1/2″ × 3″ × 1-3/4″ deep
Shipping Wgt.:	1-1/2 lbs



Model CS-2-2 (formerly 594)

Discontinued

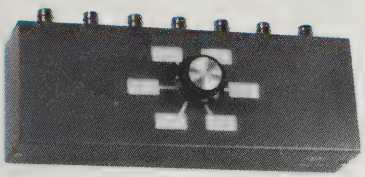
Double Pole:	Two position switch. May be used to interconnect two radios and two antennas, or two radios and an antenna and dummy load. It may also by-pass a test item like an SWR bridge. Shipping Wgt.: 1 lb.
Shipping Wgt.:	1 lb.



Model CS-3G-BNC (formerly 596)

Single Pole:	Three position switch with unused positions grounded. With BNC type coaxial connectors. Same size and weight as the Model CS-3G switch.

COAXIAL SWITCHES



Model CS-6G-BNC (formerly 597)

Single Pole: Six position switch with unused positions grounded. With BNC type coaxial connectors. Same size and weight as the Model CS-6G switch.

VHF COAXIAL SWITCHES

Model CSA-6G (formerly 375)

Single Pole: Six position switch with unused positions grounded. SO-239 UHF type coaxial connectors are mounted axially on the back surface of the switch case.

Dimensions: 4-1/4" dia. × 2-1/2" deep

Shipping Wgt.: 1 lb.

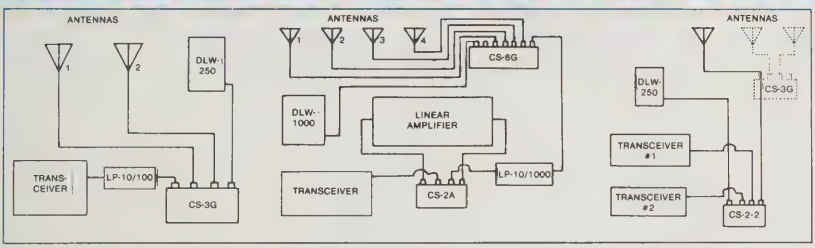
Model CSR-5G (formerly 376)

Single Pole: Five position switch with unused positions grounded. The sixth position of the switch grounds all outputs. With UHF type SO-239 coaxial connectors mounted radially on case.

Dimensions: Case 3-1/4" dia. × 2" deep

Shipping Wgt.: 1 lb.

TYPICAL USES FOR B & W COAXIAL SWITCHES AND ACCESSORIES



In a typical amateur installation having a transceiver and two separate antennas, a triband beam and a trap dipole for 40 and 80, for example, Model CS-3G coaxial switch is used to select either of the antennas or a dummy load, the Model DLW-250, for testing or power measuring. A low pass filter, the Model LP-10/100, is connected between the transceiver and the coax switch to attenuate harmonics and prevent TVI.

A high power station for 1.5 KW PEP. All of the B & W coax switches can handle the legal limit comfortably. The Model CS-6G switch was used since there are more antennas in this station. The linear can be by-passed with the CS-2A switch when operating "barefoot". Although the linear amplifier will switch the coax from the exciter to the antenna, many amateurs prefer to by-pass with a separate switch, since the amplifier tuned circuits can mismatch the line and remove power from it if they are tuned to the wrong band.

In a station having two transceivers, a two pole two position coaxial switch, the Model CS-2-2, is used to make sure that both rigs are always terminated in a proper load. Either #1 is connected to the antenna and #2 to the dummy load, or just the opposite, with #1 connected to the dummy load and #2 to the antenna. If several antennas are available, a second coaxial selector switch may be added as indicated by the dotted lines.

Model CR-115 COAXIAL RELAY

(formerly Model 377)

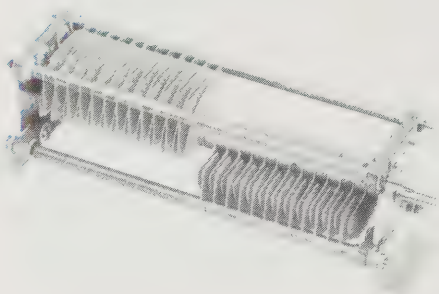
Model CR-115 coaxial relay may be used to change the antenna from receiver to transmitter automatically. The relay operation is economical and reliable, requiring .02 ampere, 48 to 120 volts AC.

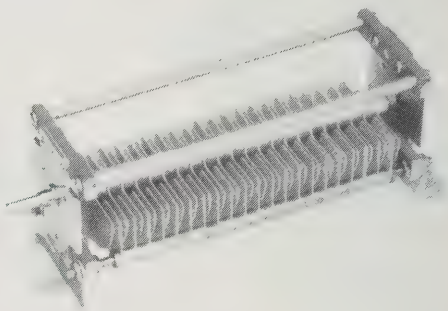
Power:	1 KW, 2 KW PEP
VSWR:	Less than 1.2:1, to 150 MHz
UHF	Type SO-239 connectors
Dimensions:	3-1/2" × 1-1/2" deep
Shipping Wgt.:	1 lb.

AIR VARIABLE TRANSMITTING CAPACITORS

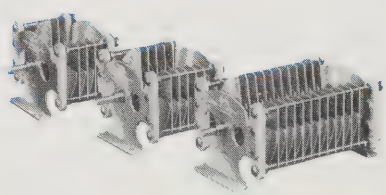
The VC series of high voltage air variable capacitors are ideal for that high power antenna tuner or linear amplifier. With an air gap of .120" they will withstand 4,000 volts peak.

Model Number	Nominal Capacity min	Nominal Capacity max	Number of Plates	Mounting Centers	Notes	Shipping Weight
VC-27	19	130	27	$5^{3}/_{4} \times 2^{1}/_{4}$		1 lb.
VC-35	24	170	35	$7 \times 2^{1}/_{4}$		$1^{1}/_{2}$ lb.
VC-43	28	210	43	$8^{1}/_{4} \times 2^{1}/_{4}$		$1^{1}/_{2}$ lb.
VC-34S	13/13	80/80	34	$7^{1}/_{4} \times 2^{1}/_{4}$	split stator, common rotor	$1^{1}/_{2}$ lb.
VC-50S	18/18	120/120	50	$9^{1}/_{2} \times 2^{1}/_{4}$		2 lbs.





BUTTERFLY CAPACITORS Type JCX50E and Type JCX25E



Rugged, high-power capacitors with 1/8-inch air gap, high-quality steatite stator insulators, grounded rotor.

Type	Capacity (pF) Per Section Max.	Per Section Min.	Sections in Series Max.	Sections in Series Min.
JCX50E	42	13	25	10
JCX25E	25	10	16	8

Dimensions
- Length (including Shaft) 5"
- Width 4-1/4"
- Height 3-1/2"

Shipping Weight 1 lb.

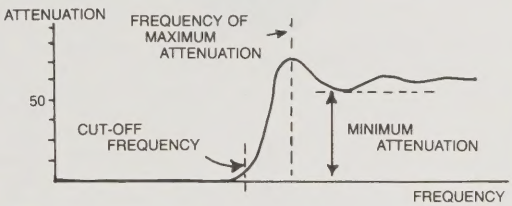
TVI FILTERS

LOW-PASS FILTERS TO ATTENUATE HARMONICS AND ELIMINATE TELEVISION INTERFERENCE AND INTERFERENCE TO OTHER RADIO SERVICES

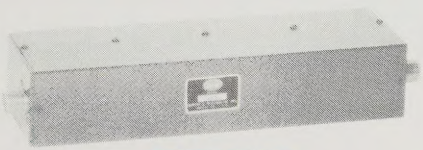
B & W filters keep oscillator frequencies and harmonics where they belong, inside your rig and not on the air to cause interference. Two sizes of filter are available to meet your power requirements. All filters are equipped with SO-239 UHF type coaxial connectors so that they may be installed in the coaxial cable leading to the antenna.

A low pass filter allows all frequencies below the cut-off frequency to pass with no opposition. Above the cut-off it offers increasing opposition. A FL-10 filter, for example, permits signals below 34 MHz to pass through it. This would include all the amateur bands from 1.8 through 30 MHz. Harmonics of a radio signal in one of these bands that is higher in frequency than 34 MHz would be attenuated, reduced in strength by the filter. These are the frequencies that cause trouble with nearby TV receivers.

Above the cut-off frequency, the attenuation is not uniform. There is a frequency where the attenuation is greatest, usually at the edge of the attenuation plateau. Although the attenuation may vary, there is a minimum attenuation that is given for each filter. This tells the least amount of harmonic reduction the filter will supply, while most of the frequencies will be attenuated more than this.



Model FL10/100
Model FL6/100



Model FL10/1500
Model FL10/1500/70
Model FL6/1500

Model FL 2/200

Model Number	Superceded Part No.	Applications	Cut-Off Freq. (MHz)	Max. Atten. Freq. (MHz)	Min. Atten. (dB)	Impedance (ohms)	Power Rating
FL10/100	424	Amateur bands below 30 MHz, CB 27MHz	44	57	60	50	100
FL10/1500	425		34	52	70	50	1500
FL10/1500/70	426		34	52	70	70	1500
FL6/100	423	Amateur bands below 54MHz	55	64	50	50	100
FL6/1500	427		55	64	70	50	1500
FL2/200	422-2	Amateur bands below 148 MHz	160	180	69	50	200

Note: Insertion Loss Less than 0.5 Db

Shipping Wgts. 1 lbs.

CYCLOMETER-TYPE COUNTER

The perfect tuning control for antenna tuners, VFO's, frequency meters, variable inductors. Faceplate is 3″ × 3″ with 2-1/4″ center mounting holes. Shaft is 1/4″ diameter. The shaft extends 3-3/8″ behind face plate.

Model 3902-1

100-turn counter. Numbers increase with clockwise rotation of handle. Black satin finish.

Mounting hardware included. Shipping Wgt. 1-1/4 lbs.

DUMMY LOADS AND WATTMETERS

Switch your transmitter into one of our dummy loads for off-the-air testing without worry about a pink ticket. All catalog dummy loads are monolithic 52-ohm non-inductive units for low VSWR to 250 MHz or above. High power loads are oil cooled with high temperature warning light.* All units use standard UHF connectors (SO-239). Precision meters on combination units show your transmitter's power output in four calibrated ranges.

1500 Watts—Oil Cooled

1000 Watts—Oil Cooled

250 Watt—Light Wt. Portable—Air Cooled

1500 Watt Oil Cooled

*Units with warning lights require 120 VAC, 6 W for warning light circuit.

Model 374 DUMMY LOAD WATTMETER

Our highest power combination unit. Rated to 1500 watts input (intermittent). Meter ranges are individually calibrated for highest accuracy.

- Specifications:

Frequency Range:	DC to 300 MHz
VSWR:	Less than 1.3:1 to 250 MHz
Power Range:	1500 watts DC intermittent. Warning light* signals maximum heat limit.
Wattmeter Ranges:	0-15, 0-50, 0-300, 0-1500
Input Connector:	UG-58 (hermetically sealed)
Size:	4¾" × 9" × 10¼"
Shipping Wgt.:	12 lbs.

Model 334A DUMMY LOAD WATTMETER

Our most popular combination unit. Handles full amateur power. Meter ranges individually calibrated. Can be panel mounted.

- Specifications:

Frequency Range:	DC to 300 MHz
VSWR:	Less than 1.3:1 to 250 MHz
Power Range:	1000 watts CW intermittent. Warning light* signals maximum heat limit.
Wattmeter Ranges:	0-10, 0-100, 0-300, 0-1000
Input Connector:	UG-58 (hermetically sealed)
Size:	4¾" × 9" × 10¼"
Shipping Wgt.:	12 lbs.

Model 333 DUMMY LOAD WATTMETER

Ideal field service unit for mobile 2-way radio-CB, marine, business band. Best for QRP amateur use, CB, with zero to 10 watts full scale low power range.

- Specifications:

Frequency Range:	DC to 300 MHz
VSWR:	Less than 1.3:1 to 250 MHz
Power Range:	250 watts intermittent.
Wattmeter Ranges:	0-10, 0-50, 0-125, 0-250
Connector:	SO-239
Size:	4" × 7" × 8"
Shipping Wgt.:	2 lbs.

Model 384 HIGH POWER LOAD

For high power when all you need is the load.

- Specifications:

Frequency Range:	DC to 300 MHz
VSWR:	Less than 1.3:1 to 250 MHz
Power Range:	1500 watts intermittent. Warning light* signals maximum heat limit.
Connector:	UG-58 (hermetically sealed)
Size:	4¾" × 9" × 10½"
Shipping Wgt.:	12 lbs.

VS 300A TRANSMATCH

DESCRIPTION AND FEATURES

The Barker & Williamson VS 300A Transmatch is designed to match virtually any receiver, transmitter or transreceiver in the 160 to 10 meter range (1.8 to 30MHz) with up to 300 watts RF power to almost any antenna, including dipoles, inverted vees, verticals, mobile whips, beams, random wires and others, fed by coax cable, balanced lines or a single wire. A 1:4 balun is built in for connection to balanced lines.

The TUNER switch, on the front panel, provides switching to one of two coax fed antennas (direct or through the tuner), and either a balanced line or wire antenna. The BYPASS (BYP) position allows switching to a dummy load or a direct connected coax antenna. In the BYPASS, COAX 1 OUT or COAX 2 OUT positions, the tuner is bypassed, but not the meter circuit.

The wattmeter of the VS 300A can be used with the tuner or when in the direct modes. The wattmeter is between the transmitter and the tuner when the TUNER switch is in the COAX 1 IN, COAX 2 IN or WIRE positions. To read the transmitter output power, set the wattmeter switch to FOR 300W and read the forward power on the 300W scale. To read the reverse power, set the wattmeter switch to REV 30W and read the reverse power on the 30W scale.

VS 1500 A TRANSMATCH

DESCRIPTION AND FEATURES

The Barker & Williamson VS 1500A Transmatch is designed to match virtually any receiver, transmitter or transreceiver in the 160 to 10 meter range (1.8 to 30 MHz) with up to 1500 watts RF power to almost any antenna, including dipoles, inverted vees, verticals, mobile whips, beams, random wires and others, fed by coax cable, balanced lines or a single wire. A 1:4 balun is built in for connection to balanced lines. The circuit uses the series parallel capacitor connection (SPC) for improved harmonic attenuation.

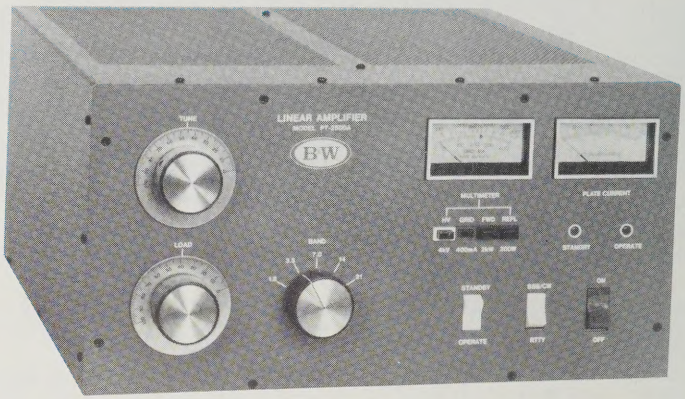
The LOAD SELECT switch, on the front panel, provides switching to one of two coax fed antennas (direct or through the tuner), a balanced line or wire antenna. The DUMMY LOAD and BYPASS positions allow switching to a dummy load and a direct connected coax antenna. In the DUMMY LOAD, BYPASS, COAX 1/TUNER OUT or COAX 2/TUNER OUT positions, the tuner is bypassed.

The wattmeter of the VS 1500A is always in the circuit and is connected directly to the TRANSMITTER connector on the back panel. To read the transmitter output power, set the wattmeter switch to FOR 300W or FOR 3KW and read the forward power on the respective scale. To read the reverse power, set the wattmeter switch to REV 300 W and read the reverse power on the 300W scale.

SPECIFICATIONS

Input Impedance	50 to 75 ohms unbalanced
Output Impedance	15 to 500 ohms unbalanced coaxial up to 500 ohms balanced feed 10 to 1000 ohms single ended feed (wire antenna).
Frequency Range	1.8 to 30 MHz continuously (roller inductor)
Power Handling	1500 watts continuous
Dimensions	11¼" W × 5¾" H × 13½" D (21.6 × 14.6 × 34.3 cm) (including dials)
Weight	6½ lb (3kg)

B&W MODEL PT-2500A



HIGH FREQUENCY LINEAR POWER AMPLIFIER
A REAL WORKHORSE—RUGGED COMPONENTS AND CONSTRUCTION

The Barker & Williamson PT-2500A is a completely self contained table top linear amplifier designed for continuous SSB, CW, RTTY, AM or ATV operations. Covers all amateur bands from 1.8 to 21 MHz. It also features wide frequency coverage for MARS and other services. Two type 3-500Z triodes provide reliability and rapid warm up time. Can be modified for frequencies other than amateur for commercial and military services.

FEATURES:

- Full 1500 watts output
- Pi-Network input for easy drive
- Dual cooling system extends component and tube life
- Illuminated S.W.R. and Power Meters
- Hum free D.C. Relay
- Vernier tuning controls for smooth and accurate settings on all frequencies
- Pi-L Silver Plated tank circuit for greater harmonic attenuation and efficiency
- Bleeder resistors (25K - 10 watt) across all computer grade filter capacitors. A real safety feature for the owner/operator
- Adjustable ALC to prevent overdriving
- SCR actuated grid protect circuit
- B + surge protection in the event of tube ion flashover. Prevents tube failure and power supply components
- Ten meters (28 MHz) available for export models

Dimensions: 17″ W × 19″ Deep × 8½″ High

Weight: 80 LBS (Shipped in 3 cartons to meet U.P.S. requirements)

Installation of Tubes and Power Transformer required by buyer.